

Neil Blumberg

CURRICULUM VITAE

1/20/2011

Neil Blumberg, M.D.

Professor, Department of Pathology and
Laboratory Medicine
Director, Clinical Laboratories, Transfusion Medicine Unit and
Blood Bank, Strong Memorial Hospital
University of Rochester School of
Medicine and Dentistry
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Rochester, New York 14642 (USA)
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Academic Appointments

1995-present Professor of Pathology and
Laboratory Medicine, University of
Rochester School of Medicine, Rochester, NY

1984-1995 Associate Professor of Pathology and
Laboratory Medicine, University of
Rochester School of Medicine, Rochester, NY
(Tenure: July, 1990)

1980-84 Assistant Professor of Pathology and
Laboratory Medicine, University of
Rochester School of Medicine

1978-80 Assistant Professor of Laboratory
Medicine, University of Connecticut
School of Medicine, Farmington, CT

1977-78 Instructor in Laboratory Medicine, Yale
University, New Haven, CT

Clinical Appointments

2004-present Director, Clinical Laboratories, Strong Memorial Hospital

1980-Present Director, Transfusion Medicine Unit, Blood Bank and Stem
Cell Processing Lab, Strong Memorial Hosp, Rochester, NY

1988 Acting Director (April-September) Clinical Laboratories, SMH

1978-80 Assistant Director, American Red Cross Blood
Services, Connecticut Region, Farmington, CT

Education

MD, 1975
Yale University School of Medicine, New Haven, CT (1970-75)

Yale University Graduate School of Arts and Sciences, Department of Molecular Biophysics and Biochemistry, New Haven, CT (1971-74)

BS, 1970
Yale College, New Haven, CT (1967-70)

Cornell University College of Arts and Sciences
Ithaca, NY (1966-67)

Residency and Postdoctoral Training

1977-78
Chief Resident, Laboratory Medicine
Yale-New Haven Hospital, New Haven, CT

1976-77
Assistant Resident, Laboratory Medicine,
Yale-New Haven Hospital, New Haven, CT

1975-76
Clinical Fellow, Laboratory Medicine,
Yale-New Haven Hospital, New Haven, CT

Honors and Awards

1971-74
NIH Medical Scientist Training Grant
Fellowship

1970
BS, Yale, Magna cum laude

1969
Phi Beta Kappa

1966-70
National Merit Scholar

Grants and Contracts

2009-2013
NIH, NHLBI R01 HL095467, P.I. (Co-PIs: N. Blumberg, R. Phipps) 10% salary/effort. "Identification and Significance of Biologic Mediators in Red Cell Concentrates" \$250,000 ADC

2009-2011
NIH, NHLBI RC1 HL100051 Co-investigator 5% salary/effort (PI: Phipps) "Microparticles as Messengers of Communication Between Blood and Vascular Cells" \$500,000 ADC.

2009-2011
NIH, NHLBI R21 HL093129. Co-investigator, 5% salary/effort. "Blood transfusions: gender differences in utilization, predictors and outcomes." \$234,000 ADC. MAM Rogers PhD, P.I. University of Michigan.

2006-08
NIH, NHLBI 1 R21HL086367. Co-investigator, 5% salary/effort. "Normal and Type-2 Diabetic Platelet Proteomics and Storage for Transfusion." \$150,000 ADC. RP Phipps PhD, P.I.

2004-08 NIH, NHLBI. 1 R01HL078603. Co-Investigator, 5% salary / effort. "Platelet Activation and Inflammatory Mediators" \$200,000 ADC. RP Phipps PhD, P.I.

2002-04 James P. Wilmot Cancer Center Discovery Fund Seed Grant, University of Rochester, co-P.I. "The clinical consequences of transfusing platelet CD40 ligand (CD154) in adult acute myeloid leukemia (AML)." \$25,000

2001-04 Gambro BCT, Inc., P.I., Lakewood, CO. CD40 Ligand and platelet transfusion immunology. \$10,000 unrestricted grant.

1992-97 Pall Biomedical Corp., Glen Cove, NY. P.I., 10% effort. "The Use of Leukocyte-Depleted Blood Components in Adult Lymphoma Patients Receiving Autologous Bone Marrow Transplantation (BMT) or Newly Diagnosed Adults with Acute Leukemia," \$20,000.

1992-95 American Red Cross, Bethesda, MD. Co-investigator, 5% effort. "Immune complexes and the pathogenesis of platelet transfusion refractoriness and autoimmune thrombocytopenia," \$175,520. JM Heal, MRCP, P.I.

1992-94 Ortho Biotech, Raritan, NJ. P.I., 5% effort. "Immunologic and clinical effects and cost effectiveness of autologous versus homologous transfusions in hip replacement surgery," \$17,190.

1990-92 American Red Cross, Bethesda, MD. Co-investigator, 5% effort. "Immune complexes and antibodies to plasma proteins in the pathogenesis of platelet transfusion refractoriness," \$153,358. JM Heal, MRCP, P.I.

1988-93 NIH, National Institute of Aging. RO 1AG08178. Co-Investigator, 10% salary / effort. "Pathogenetic aspects of erythrocyte autoantibody formation in man." \$97,172 ADC for 88-89. J Leddy, MD, P.I.

1989-91 AABB Research Foundation, P.I., 5% effort. "A comparison of the clinical and immunologic effects of autologous or homologous transfusions in patients undergoing spinal fusion surgery." \$26,925.

1987-89 American Red Cross, Bethesda, MD, Co-investigator, 5% effort. "Multicenter Trial of Cross-matching versus HLA Matching for Patients Refractory to Platelet Transfusion," \$53,000. JM Heal, MRCP, P.I.

1985-87 American Red Cross, Bethesda, MD, Co-investigator, 5% effort. "Use of Chloroquine as an

Eluting Agent for the Evaluation of Patients Refractory to Platelet Transfusion", \$134,336. JM Heal, MRCP, P.I.

1984-85

New York State AIDS Institute AO107, P. I., 20% salary/effort. "Antibody to Peripheral Blood Cells in AIDS", \$85,000 ADC.

PATENTS

Peroxisome Proliferator-Activated Receptor (PPAR) Expression in Human Body Fluids, Platelets and Secretions

Use of Peroxisome Proliferator-Activated Receptor Gamma (ppar) and /or Retinoic Acid Receptor (RXR) Agonists to Inhibit Platelet Functions
PCT/US2004/35065

Use of Peroxisome Proliferator-Activated receptor (PPAR) Gamma Agonists to Inhibit Platelet Release of CD40 Ligand and Treat CD40 Ligand-Mediated Conditions
2004285486

Licensure and Board Certificates

Diplomate, National Board of Medical Examiners (USA), July 1976

New York State Medical License, 1980

American Board of Pathology (Clinical Pathology), 1978; Fellow, College of American Pathologists

Laboratory Director Certificate of Qualification, NY State, 1984

Special Training

Hartford Graduate Center, Management Development Program, June 1979

Professional and Peer Review Activities

Ad hoc reviewer for various journals including NEJM, British Journal of Haematology, etc. Abstract reviewer for ASH and AABB annual meetings (co-ordinating Transfusion Medicine reviewer for ASH, 2003 and 2009). Consultant to Fenwal (Baxter), Bayer, Pall, Caridian BCT(Gambro), Ortho Biotech.

2008-2012

Member, Editorial Board, BLOOD

2008-present

Member, Editorial Board, Advances in Hematology

1990-Present

Member, Editorial Board, TRANSFUSION

2005-2011

Chair, Study Monitoring Board, NHLBI REDS II

2010-present

Medical Consultant, Medical Laboratory Evaluation Program
American College of Physicians

2010	Chair, NHBLI REDS III Special Emphasis Grant Review Panel
2010	NHLBI Erythrocyte and Leukocyte Biology Study Section Ad Hoc Member
2009	NHLBI State of the Science Symposium on Clinical Trials in Transfusion Medicine, Hemostasis & Thrombosis, Invited Participant
2009	NHLBI Ad Hoc Study Section—Phase II Clinical Trials ARRA Grand Opportunities Program
2007	Discussion Leader/Chair--NHLBI Working Group on Clinical Outcomes in Transfusion Medicine
2007	NHLBI Working Group on the Immune Consequences of Allogeneic Exposure, Invited Speaker
2007	NHLBI Ad Hoc Study Section—Transfusion Medicine Hemostasis Clinical Research Network
2006-2011	AABB Biovigilance Working Group
2006-2007	NHLBI Working Group on Blood Safety/Availability Strategic Plan
2005; 2007	NHLBI T32 Training Grant Study Section Ad Hoc Member
2004	NHLBI REDS II Study Section Member
1999-present	Dean's Research Advisory Committee-Univ. Rochester
1997-2007	Member, Clinical Council, Strong Memorial Hospital
1995-1999	Chair, Regional Medical Advisory Committee (NY-Penn Red Cross) and Member, Blood Services Board
1992-1997	Member, Utilization Management Committee Strong Memorial Hospital
1986-1995	Member, Executive Council (to 1989) and Editor, Newsletter, Academy of Clinical Laboratory Physicians & Scientists
1982-1990	Member, District Advisory Group, Northeast Region, American Association of Blood Banks
1982-1986	Member, Committee on Component Therapy, American Association of Blood Banks
1981-85	Member, Quality Assurance Committee and its

	Steering Committee, Strong Memorial Hospital
1980-85	Chairman, Blood Utilization Committee, Strong Memorial Hospital
1978-80	Abstractor, <u>Transfusion</u>
1976-78	Member, Executive Board, Connecticut Area II PSRO
1976-78	Member, Patient Care Studies Committee, Yale-New Haven Hospital
1971-78	Editorial Board and Book Review Editor, <u>Yale Journal of Biology and Medicine</u>
1976-78	Member and Secretary, Housestaff Council Yale-New Haven Hospital

Professional Societies

American Society of Hematology
 American Association of Blood Banks
 Academy of Clinical Laboratory Physicians and Scientists
 American Association for the Advancement of Science
 College of American Pathologists
 American Society of Clinical Pathologists

Abstracts (Since 1991)

1. Cox MT, Roberts M, Lajoie J, Enfonde M, Kress D, **Blumberg N.** A clinically significant primary response at ten days in a previously untransfused child. *Transfusion* 31 (Supplement): 28S (1991). Presented to the AABB, November, 1991, Baltimore MD.
2. Cox MT, Sheils L, Masel D, **Blumberg N.** Fetal hydrops due to anti-B. *Transfusion* 31 (Supplement): 29S (1991). Presented to the AABB, November, 1991, Baltimore MD.
3. Heal JM, Masel D, **Blumberg N.** Circulating immune complexes involving the ABO system in patients refractory to platelet transfusions. *Transfusion* 31 (Supplement): 103S (1991). Presented to the AABB, November, 1991, Baltimore MD.
4. Heal J, Cowles J, Masel D, Rowe J, **Blumberg N.** Evidence for indirect mechanisms of post-transfusion platelet destruction--platelet count decrements

- after incompatible transfusions. *Blood* 78 (Supplement): 348a (1991). Presented to the Amer. Soc. of Hematology, December, 1991, Denver CO.
5. Heal J, Rowe J, **Blumberg N.** The importance of ABO identical platelet transfusions. *Blood* 78 (Supplement): 348a (1991). Presented to the Amer. Soc. of Hematology, December, 1991, Denver CO.
 6. Heal J, Kenmotsu N, Rowe J, **Blumberg N.** A survival advantage in leukemics receiving ABO identical platelets. *Blood* 78 (Supplement): 349a (1991). Presented to the Amer. Soc. of Hematology, December, 1991, Denver CO.
 7. Heal J, Cowles J, Masel D, Rowe J, **Blumberg N.** Antibodies to plasma proteins--a possible contributing cause of platelet transfusion refractoriness. *Blood* 78 (Supplement): 349a (1991). Presented to the Amer. Soc. of Hematology, December, 1991, Denver CO.
 8. Cox MT, Marciano K, McMican A, **Blumberg N.** A training program for new technologists using a one on one approach. *Transfusion* 32(Supplement): 90S (1992). Presented to the Amer. Assn. of Blood Banks, November, 1992, San Francisco, CA.
 9. **Blumberg N,** Heal J, Rapoport A, DiPersio J, Rowe J, Panzer R. Effect of ABO-identical platelets and leukodepletion on blood utilization and costs of autologous bone marrow transplantation. *Transfusion* 33(Supplement): 83S (1993). Presented to the Amer. Assn. of Blood Banks, October, 1993, Miami, FL.
 10. **Blumberg N,** Heal J, Kirkley S, Panzer R, Rowe J. Cost effectiveness of leukodepleted transfusions during induction therapy for acute leukemia. *Transfusion* 33(Supplement): 83S (1993). Presented to the Amer. Assn. of Blood Banks, October, 1993, Miami, FL.
 11. Heal JM, Masel D, **Blumberg N.** Platelets coated with ABO immune complexes from refractory patients are associated with increased adhesion to monocytes. *Transfusion* 33(Supplement): 16S (1993). Presented to the Amer. Assn. of Blood Banks, October, 1993, Miami, FL.
 12. **Blumberg N,** Kirkley S, Panzer R, Heal J. A cost analysis of autologous compared to autologous plus allogeneic blood transfusions in hip replacement surgery. *Brit J Haematol* 87(Supplement): 72 (1994). Presented to the European Hematology Association, Brussels, Belgium, June, 1994.
 13. Kirkley S, Cowles J, Pellegrini V, Harris C, Boyd A, **Blumberg N.** T helper 2 (Th2) type cytokine secretion found in surgical patients receiving allogeneic blood. *Transfusion* 35(Supplement): 44S (1995). Presented to the Amer. Assn. of Blood Banks, November, 1995, New Orleans, LA.

14. Heal JM, Masel D, **Blumberg N**. Inhibition of immune complex binding to platelets by monoclonal antibodies to the Fc and C1q receptors. *Transfusion* 35(Supplement): 19S (1995). Presented to the Amer. Assn. of Blood Banks, November, 1995, New Orleans, LA.
15. **Blumberg N**, Kirkley S, Heal J. The potential public health impact of allogeneic transfusion immunomodulation. *Blood* 86(Supplement): 854a (1995).
16. **Blumberg N**, Cowles J. Hypotension and allogeneic transfusion as predictors of morbidity after coronary artery surgery. *Transfusion* 36(Supplement): 35S (1996). Presented to the Amer. Assn. of Blood Banks, October, 1996, Orlando, FL.
17. **Blumberg N**, Heal JM. A new theory of transfusion immunology. *Blood* 88(Supplement 1-Part 2): 89b (1996)
18. **Blumberg N**, Heal JM, Rowe JM, Kirkley SA. Reduced morbidity and mortality in adult acute leukemia associated with leukodepleted blood transfusions. *Blood* 90 [Supp. 1]: 155a (1997). Presented to the Amer. Soc. Hematology, December, 1997, San Diego, CA.
19. Rios J, Korones DN, Heal JM, **Blumberg N**. Reduced morbidity in pediatric acute lymphocytic leukemia with leukodepleted blood transfusions. *Transfusion* 38 [Supplement]: 25S (1998). Presented to the Amer. Assn. of Blood Banks, October, 1998, Philadelphia, PA.
20. Vo, TD, Cowles JW, Heal JM, **Blumberg N**. Efficacy of washed platelets in prevention of transfusion reactions. *Blood* 94[Supp. 1]: 462a (1999). Presented to the Amer. Soc, Hematology, December, 1999, New Orleans, LA.
21. **Blumberg N**, Heal JM, Hicks GL, Jr, Risher WH. Morbidity and mortality in cardiac surgery associated with transfusion of ABO mismatched platelets. *Transfusion* 40[Supplement]: 130S (2000). Presented to the AABB, November 2000, Washington, DC.
22. **Blumberg N**, Heal JM, Cowles JW, Hicks GL, Jr, Risher WH, Samuel PK, Kirkley, SA. Leukoreduced transfusions in cardiac surgery: results of an implementation trial. *Transfusion* 40[Supplement]: 40S (2000). Presented to the AABB, November 2000, Washington, DC.
23. Kaufman J, **Blumberg N**, Phipps RP. A role for platelet derived CD40 ligand (CD154) in acute inflammation. *FASEB J* 15(4) Part I: A337 (2001). Presented to the FASEB, AAI, April, 2001, Orlando, FL.
24. Vanderlinde E, Kaufman J, Phipps R, **Blumberg N**. CD40 ligand accumulation during storage of human platelet concentrates: implications for transfusion complications. *Am. J. Clin Path.* 118: 292-293 (2002). Presented to the ACLPS, May, 2002, NY, NY.

25. **Blumberg N**, Heal JM, Gettings KF. Leukoreduction of red cell transfusions is associated with a decreased incidence of red cell alloimmunization. *Transfusion* 42[Supplement]: 26S (2002). Presented to the AABB, October, 2002, Orlando, FL.
26. **Blumberg N**, Heal JM, Rowe JM. Platelet transfusion and clinical outcome in acute leukemia in adults. *Transfusion* 42[Supplement]: 5S (2002). Presented to the AABB, October, 2002, Orlando, FL.
27. Coppage M, **Blumberg N**, Chen L, Massey T, Heuther J, Zand M., Leong N, Shanahan T. Allosensitization and LVAD: it's in the blood-abrogation of HLA allosensitization by transfusion with leukoreduced, ABO identical blood products. *Human Immunology*. 64(10 Suppl):S44, (2003); *Blood* 102: 562a (2003). Presented to the ASHI, October, 2003 and Amer. Soc. Hematology, December, 2003, San Diego, CA.
28. **Blumberg N**, Zhao H, Messing S, Heal JM, Lyman GH. Misapplication of the intention to treat principle in clinical trials and meta-analyses of leukoreduced blood transfusions in surgical patients. *Blood* 102: 562a (2003). Presented to the Amer. Soc. Hem., December 2003, San Diego, CA.
29. **Blumberg N**, Fine L, Gettings KF, Heal JM. Decreased line related infections coincident with implementation of universal leukoreduction of blood transfusions. *Transfusion* 44[Supplement]: 4A (2004). Presented to the AABB, October 2004, Baltimore, MD.
30. **Blumberg N**, Gettings KF, Turner C, Heal JM, Phipps RP. The role of platelet derived soluble CD40 L(sCD40L; CD154) in adverse reactions to platelet transfusions. *Transfusion* 44[Supplement]: 18A (2004). Presented to the AABB, October 2004, Baltimore, MD.
31. **Blumberg N**, Boshkov L, Silliman CC, Kelher M, Gettings KF, Heal JM, Phipps RP. CD40L as a cofactor in the development of transfusion related acute lung injury (TRALI). *Blood* 104: 237a (2004). Presented to the Amer. Soc. Hem., December 2004, San Diego, CA.
32. **Blumberg N**, Gettings KF, Heal JM. ABO mismatched platelet, plasma and cryoprecipitate transfusions and bleeding in transfused surgical patients. *Blood* 106: 122b (2005).
33. Phipps RP, Ray DM, Akbiyik F, Francis CW, Taubman M, **Blumberg N**. Human platelets and megakaryocytes express the transcription factor PPAR gamma and respond to prostaglandin PPAR gamma ligands: implications for inflammation, diabetes and cardiovascular disease. *Prostaglandins and Other Lipid Mediators* 79: 166 (2006).
34. Fialkow LB, Coppage M, Mbaker ML, Chen L, Gettings K, Meehan D, Massey DT, **Blumberg N**. Abrogation of HLA allosensitization in ventricular assist device recipients transfused with leukoreduced, ABO identical blood products. *Transfusion* 47 [Supplement]: 135A-36A (2007). Presented to the AABB, Anaheim, CA, October, 2007.

35. Fialkow LB, Zucchiatti A, Cheng J, Piotrowski ES, Lentz C, King R, Stassen N, Gestring M, **Blumberg N**, Bankey P. ABO non-identical transfusions and red blood cell usage in blunt trauma patients. *Transfusion* 47 [Supplement]: 192A-93A (2007). Presented to the AABB, Anaheim, CA, October, 2007.
36. **Blumberg N**, Fialkow LB, Gettings K, Zucchiatti A, Heal JM, Bankey PE. Blood group O and ABO non-identical platelet transfusions are associated with increased red cell utilization in non-trauma surgical patients. *Blood* 110: 71B (2007).
37. Kanda J, Ichinohe T, Matsuo K, Benjamin RJ, Klumpp TR, Rozman P, **Blumberg N**, Mehta J, Sohn SK, Uchiyama T. Individual patient data-based meta-analysis of cohort studies comparing clinical outcomes of ABO mismatched or matched stem cell transplantation in patients with haematological malignancies. *Bone Marrow Transplantation* 41(Supplement): S22 (2008).
38. Refaai M, Masel E, Gettings K, Phipps R, Spinelli S, Corsetti J, Fialkow L, Francis C **Blumberg N**. The effects of anti-A and anti-B on platelet function: an in vitro model of ABO non-identical transfusion. *Transfusion* 48[Supplement]: 210A (2008). Presented to the AABB, Montreal, Canada, October, 2008.
39. Gettings K, Howk N, Masel D, Refaai M, Kirkley S, Heal J, **Blumberg N**. Providing ABO identical platelets to all patients-methods and clinical outcomes. *Transfusion* 48[Supplement]: 82A (2008). Presented to the AABB, Montreal, Canada, October, 2008.
40. Refaai M, Khorana A, Francis C, **Blumberg N**, Culakova E, Lyman G. Blood transfusions, thrombosis and mortality in hospitalized cancer patients. *Transfusion* 48[Supplement]: 202A (2008). Presented to the AABB, Montreal, Canada, October, 2008.
41. **Blumberg N**, Heal J, Masel D, Gettings K, Refaai M, Kirkley S, Fialkow L. Decreased TACO, TRALI and febrile but not allergic reactions after implementation of universal leukoreduction. *Transfusion* 48[Supplement]: 202A-203A (2008). Presented to the AABB, Montreal, Canada, October, 2008.
42. Refaai M, Chuang C, Menegus M, **Blumberg N**, Francis C. Outcomes after platelet transfusion in patients with heparin-induced thrombocytopenia. *Transfusion* 48[Supplement]: 35A (2008). Presented to the AABB, Montreal, Canada, October, 2008.
43. Sahler J, Bernard J, Spinelli S, Casey A, **Blumberg N**, Phipps R. Parthenolide, an anti-inflammatory NFkB inhibitor, stimulates platelet production and blunts platelet activation. *J. Immunol.* 184: 87:17 (2010). Presented to the Amer. Assn Immunologists Baltimore, MD, May 2010.

Reviews, Editorials, Chapters and Texts

1. **Blumberg N**. Tumor angiogenesis factor--speculations on an approach to cancer chemotherapy. *Yale J. Biol. Med.* 47: 71-81 (1974).

2. **Blumberg N.** Actinomycin D--a review of its biology and chemotherapeutic properties with a reevaluation of its use as an antineoplastic agent. Yale University School of Medicine, 1975. Thesis for the M.D. degree.
3. Snyder E, **Blumberg N**, Silbert J. Blood transfusion reactions and complications. Med-Ed Series in Clinical Teachings, MEDCOM, Garden Grove, CA (1979). Audiovisual program of 52 slides and audiocassette.
4. Snyder E, **Blumberg N**, Heal JM. Blood Component Therapy. Med-Ed Series in Clinical Teachings, MEDCOM, Garden Grove, CA (1980). Audiovisual program of 66 slides and audiocassette.
5. **Blumberg N**, Katz AJ. Partial plasma exchange: diseases in which it is of reported efficacy, in Therapeutic Hemapheresis-A Technical Workshop, ed. by EM Berkman and J Umlas, pp. 79-95. American Association of Blood Banks, Washington, DC, 1980.
6. **Blumberg N**, Katz AJ. Therapeutic plasmapheresis and cytopheresis--a review. Connecticut Med. 45: 85-90 (1981).
7. Snyder E, Kennedy M, **Blumberg N** et al. Blood Transfusion Therapy--A Physician's Handbook. American Assn of Blood Banks, Arlington, VA, 1983, 83 pp (2nd Edition, 1987).
8. Snyder E, Kennedy M, **Blumberg N** et al. Blood Transfusion Therapy--An Audiovisual Program. American Association of Blood Banks, Arlington, VA, 1985, 71 slides and cassette.
9. Snyder E, Kennedy M, **Blumberg N** et al. Blood Transfusion Therapy--A Self-Assessment Program. American Association of Blood Banks, Arlington, VA, 1984, 23 pp.
10. Snyder E, Kennedy M, **Blumberg N** et al. Blood Transfusion Therapy--Patient Management Problems. American Association of Blood Banks, Arlington, VA, 1984, 119 pp.
11. Snyder E et al, eds. Adverse Transfusion Reactions, Professional self-assessment program, immunohematology series. American Assn. of Blood Banks and American Soc. of Clinical Pathologists, Chicago, IL, 1986.
12. **Blumberg N**, Heal JM. Perioperative blood transfusion and solid tumor recurrence--a review. Cancer Investigation 5: 615-625 (1987). A later version of this review is in Blood Reviews 1: 219-229 (1987).
13. **Blumberg N.** The fate of cells of the immune system during blood storage and after transfusion. Plasma Therapy and Transfusion Technology 9: 303-308 (1988)

14. **Blumberg N**, Heal JM. Transfusion and host defenses against cancer recurrence and infection--a review. *Transfusion* 29: 236-245 (1989).
15. **Blumberg N**, Heal JM. Transfusion and recipient immune function. *Arch Path Lab Med* 113: 246-253 (1989).
16. Heal JM, **Blumberg N**. The rationale for limiting recipient exposure to homologous transfusions--an overview. In *Limiting Homologous Exposure: Alternative Strategies*, KB Carlson and AH Golub, Eds. Amer. Assn. of Blood Banks, Arlington, VA, 1989, pp. 1-7.
17. Triulzi D, **Blumberg N**, Heal JM. The association between transfusion and perioperative bacterial infection. *CRC Critical Reviews in Laboratory Medicine* 28: 95-107 (1990).
18. **Blumberg N**, Heal JM. Transfusion as a predisposing factor for cancer recurrence and perioperative bacterial infection. *Yale J Biology Med* 63: 429-434 (1990).
19. Triulzi DJ, Heal JM, **Blumberg N**. Transfusion induced immunomodulation and its clinical consequences. In *Transfusion Medicine in the 1990's*, SJ Nance, Ed., Amer. Assn. of Blood Banks, Arlington, VA, 1990, pp. 1-33 .
20. **Blumberg N**, Triulzi DJ, Heal JM. Transfusion induced immunomodulation and its clinical consequences. *Transfus Med Rev* 4 (Suppl 1): 24-35 (1990).
21. **Blumberg N**. Beyond ABO and D matching: how far and for whom? *Transfusion* 30: 482-484 (1990) (editorial).
22. **Blumberg N**, Heal JM. Immunologic consequences of transfusion. In *Australian Anesthesia 1992*. D. Kerr and J. Thirlwell, Eds. Australian and New Zealand College of Anaesthetists, Melbourne, 1992, pp. 159-163.
23. **Blumberg N**, Heal JM. Immunology of blood transfusion. *Current Opinion in Hematology* 1: 330-336 (1993).
24. **Blumberg N**, Heal JM. Transfusion associated immunomodulation. In *The Scientific Basis of Transfusion Medicine*, K Anderson and P Ness, Eds. WB Saunders, 1994, pp. 580-597.
25. **Blumberg N**, Heal JM. Effects of transfusion on immune function--cancer recurrence and infection. *Arch Path Lab Med* 118: 371-379 (1994).
26. Kirkley SA, **Blumberg N**. Use of single donor platelets. *Blood Reviews* 8: 142-147 (1994).

27. Triulzi D, **Blumberg N**. Leukocyte depletion and transfusion induced immunomodulation. In *Clinical Benefits of Leukodepleted Blood Products*, J Sweeney and A Heaton, Eds., RG Landes, Austin, TX, 1995, pp. 113-127.
28. Dzik S, Blajchman MA, **Blumberg N**, Kirkley SA, Heal JM, Wood K. Current research on the immunomodulatory effects of allogeneic blood transfusion. *Vox Sang* 70: 187-194 (1996).
29. **Blumberg N**, Heal JM. Immunomodulation by blood transfusion--a continuing scientific and clinical challenge. *Amer J Med* 101: 299-308 (1996).
30. **Blumberg N**, Heal JM. The transfusion immunomodulation theory--the Th1/Th2 paradigm and an analogy with pregnancy as a unifying mechanism. *Sem Hematology* 33: 329-340 (1996).
31. **Blumberg N**. Allogeneic transfusion and infection: economic and clinical implications. *Sem Hematology* 34 [Supplement 2]: 34-40 (1997).
32. Kirkley SA, **Blumberg N**. Increased postoperative infections after allogeneic transfusions. In *Autotransfusion: Therapeutic Principles and Trends*, RL Tawes, Ed., Appleton, Detroit, MI, 1997, pp. 368-373.
33. **Blumberg N**, Heal JM. Blood transfusion immunomodulation--the silent "epidemic." *Arch Path Lab Med* 122: 117-119 (1998) (editorial).
34. Griggs JJ, **Blumberg N**. Recombinant erythropoietin and blood transfusions in cancer chemotherapy-induced anemia. *Anti-Cancer Drugs* 9: 925-932 (1998).
35. **Blumberg N**, Kirkley SA. Blood Transfusion. In: *Orthopaedic Knowledge Update Edition 6*. JH Beaty, Editor. American Academy of Orthopaedic Surgeons, Rosemont, IL, 1999, pp. 55-62.
36. **Blumberg N**, Heal JM. History of the Transfusion Immunomodulation Theory. In: *Immunomodulatory Effects of Blood Transfusion*, E C Vamvakas and MA Blajchman, Eds., AABB Press, Bethesda MD, 1999, Chapter 1, pp. 1-12.
37. Heal JM, **Blumberg N**. The second century of ABO: and now for something completely different. *Transfusion* 39: 1155-1159 (1999) (editorial).
38. **Blumberg N**, Heal JM. Transfusion immunomodulation. In: *The Scientific Basis of Transfusion Medicine*, 2nd Edition, K Anderson and P Ness, Eds., WB Saunders, 2000, Chapter 30, pp. 427-443.
39. **Blumberg N**, Heal JM, Triulzi DJ. Immunomodulation and allogeneic transfusion. In: *Transfusion Medicine & Alternatives to Blood Transfusion*, NATA, R&J Editions Médicales, Paris, 2000, pp 67-82.

40. **Blumberg N**, Heal JM. Cost effectiveness of allogeneic versus autologous blood use. In: *Transfusion Medicine & Alternatives to Blood Transfusion*, NATA, R&J Editions Médicales, Paris, 2000, pp. 495-499.
41. **Blumberg N**, Heal JM. Transfusion immunomodulation and leukoreduction. *Problems in General Surgery* 17: 7-17 (2000).
42. Heal JM, **Blumberg N**. Blood Transfusion--a booklet for patients. Leukemia and Lymphoma Society, New York, NY, 2000.
43. **Blumberg, N**. Transfusion-induced immunomodulation: an overview. *Transfusion Medicine Reviews* 15: 110-112 (2001).
44. Vanderlinde E, Heal JM, **Blumberg N**. Autologous transfusion. *British Medical Journal (BMJ)* 324: 772-775 (2002).
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91. Springer DL, Miller JH, Spinelli SL, Pasa-Tolic L, Purvine SO, Daly DS, Zangar RC, Jin S, **Blumberg N**, Francis CW, Taubman MB, Casey AE, Wittlin SD, Phipps RP. Platelet proteome changes associated with diabetes and during platelet storage for transfusion. *J. Proteome Research* 8: 2261-72 (2009).
92. Coppage M, Baker, M, Fialkow L, Meehan D, Gettings K, Chen L, Massey HT, **Blumberg N**. Lack of significant de novo HLA allosensitization in ventricular assist device recipients transfused with leukoreduced, ABO identical blood products. *Human Immunology* 70: 413-416 (2009).
93. Bernard JJ, Seweryniak KE, Koniski AD, Spinelli SL, **Blumberg N**, Francis CW, Taubman MB, Palis J, Phipps RP. Foxp3 regulates megakaryopoiesis and platelet function. *Arteriosclerosis, Thrombosis & Vascular Biology* 29: 1874-82 (2009).
94. Rogers MAM, **Blumberg N**, Saint S, Langa, KM, Nallamotheu BK. Hospital variation in transfusion and infection after cardiac surgery: a cohort study. *BMC Medicine* July 31: 7:37 (2009).
95. Spinelli SL, Casey AE, Pollock SJ, Gertz JM, Narasipura SD, Mody NA, King MR, Maggirwar SB, Francis CW, Taubman MB, **Blumberg N**, Phipps RP. Platelets and megakaryocytes contain functional NF-kB. *Arteriosclerosis, Thrombosis & Vascular Biology* 30: 591-598 (2010).
96. Zucchiatti A, Fialkow LB, Fisher S, Piotrowski E, Sangosanya E, Cheng J, Stassen N, Gestring M, **Blumberg N**, Bankey P. ABO Non-Identical Plasma Component Transfusion Increases Post-Trauma Thrombocytopenia and MODS (submitted, 2010).
97. **Blumberg N**, Heal JM, Gettings KF, Phipps RP, Masel D, Refaai M, Kirkley SA, Fialkow LB. Decreased cardiopulmonary complications (TRALI and TACO) after implementation of universal leukoreduction of blood transfusions. *Transfusion* 50: 2738-2744 (2010).
98. Refaai MA, Fialkow LB, Heal JM, Gettings KF, Spinelli SL, Phipps RP, Masel E, Smith B, Corsetti J, Francis CW, Bankey PE, **Blumberg N**. An association of ABO mismatched platelet and cryoprecipitate transfusions with increased red cell transfusion needs and mortality in surgical patients. (submitted, 2010).
99. Bernard JJ, Francis CW, Taubman MB, Spinelli SL, **Blumberg N**, Phipps RP. 15-deoxy- $\Delta^{12,14}$ prostaglandin J_2 induces vascular endothelial growth factor (VEGF) synthesis in megakaryocytes. (submitted, 2010).
100. Refaai M, Chuang C, Menegus M, **Blumberg N**, Francis C. Outcomes after platelet transfusion in patients with heparin-induced thrombocytopenia. *J Thrombosis Haemostasis* 2010 Mar 19. [Epub ahead of print] (research letter).
101. Cholette JM, Mamikonian L, Alfieris GM, **Blumberg N**, McDermott M, Lerner NB. Aspirin resistance following pediatric cardiac surgery. *Thrombosis Research*

(in press, 2010).

102. Rogers M, **Blumberg N**, Heal J, Langa K. Utilization of blood transfusion among older adults in the United States. *Transfusion* (in press, 2010).
103. Sahler J, Bernard JJ, Spinelli SL, **Blumberg N**, Phipps RP. Parthenolide enhances platelet production and attenuates platelet activation through NF-kB inhibition. (submitted).

Invited Lectures/Visiting Professorships (Since 1991)

March 28-29, 1991--Rita and Taft Schreiber Memorial Lectureship in Transfusion Medicine/Visiting Professor, Cedars-Sinai Medical Center/UCLA, Los Angeles, CA. "Risks Associated with Blood Transfusion Therapy--a 1991 Perspective" and "Transfusion Associated Immunomodulation and Its Clinical Consequences."

April 3, 1991 --Surgical Grand Rounds, Hamot Medical Center, Erie, PA. "Transfusion, cancer recurrence and postoperative bacterial infection."

May 1, 1991 --Surgical Grand Rounds, Infectious Disease Grand Rounds and Citywide Hematology Conference--Visiting Professor at Sunnybrook Medical Center (University of Toronto, Canada).

May 17-18, 1991--Rochester, MN--Mayo Clinic--Hematology and Transfusion Medicine Grand Rounds--Visiting Professor.

May 28, 1991--Medical Grand Rounds, St. Mary's Hospital, Rochester, NY "Transfusion Induced Immunosuppression."

September 24-28, 1991--Invited Speaker, Joint Meeting of the Australasian Society of Blood Transfusion and The Haematology Society of Australia; Joint Session with the Australian Society of Anesthetists. "Transfusion induced immunomodulation; Platelet transfusion refractoriness; Erythropoietin and surgery." Melbourne, Australia.

October 26, 1991--Invited Speaker, Canadian Society of Blood Transfusion Fall Seminar, "Transfusion and its relation to cancer recurrence and postoperative infection." London, Ontario, Canada. University of Western Ontario, London, Canada--Visiting Professor in Transfusion Medicine.

October 17, 1991-- Orthopaedic Grand Rounds, Strong Memorial Hospital.

November 9-10, 1991--Baltimore, MD--Amer. Assn. of Blood Banks--Invited Speaker--Workshop on "Transfusion Medicine 1991 and Beyond"

November 21, 1991--Galveston, TX--University of Texas Medical Branch--Surgical Grand Rounds--Visiting Professor.

June 17, 1992--New Haven, CT--Yale University Dept. of Laboratory Medicine--Invited Speaker--Retirement Symposium for Joseph R. Bove

September 26, 1992--Grand Rounds, Dept. of Surgery, University of Colorado, Denver, CO.

October 30-31, 1992--Dept. of Medicine, University of Wisconsin, Madison, WI, Visiting Professor.

December 9-10, 1992-- Invited Speaker, Los Angeles Red Cross Blood Services 50th Anniversary Symposium, Long Beach, CA.

March 2, 1993--Community General Hospital, Syracuse, NY. Medical Grand Rounds.

May 6, 1993--Invited Speaker. California State Assn. of Blood Banks Annual Meeting, Newport Beach, CA.

May 13, 1993--Invited Speaker. Norfolk Red Cross/East Virginia Medical School Symposium on Transfusion Practices, Norfolk, VA

August 26, 1993--Invited Speaker. College of American Pathologists Conference on Transfusion Medicine--Practices and Issues. Aspen, CO.

October 24-25, 1993--Invited Speaker. Pall Biomedical, American Red Cross, AABB and CCBC Symposium on Cost-Effectiveness of Leukocyte Depletion. Miami Beach, FL.

November 3, 1993--Invited Speaker. Case Western University School of Medicine Symposium on the Management of Anemia in Cancer Patients, Cleveland, OH.

November 16, 1993--Hematology Research Conf., Dept. of Medicine, University of Rochester.

November 23, 1993--Dept. of Surgery, University of Michigan/St. Joseph's Mercy Hospital. Grand Rounds. Ann Arbor, MI.

January 27-28, 1994--Invited Speaker/Co-Chair. Conference on Blood Transfusion in Cancer. Sponsored by the Erasmus University/Leiden University/Netherlands Red Cross. Leiden, The Netherlands.

April 15, 1994--Invited Participant. Canadian National Red Cross Advisory Committee on Leukocyte Depletion Policy. Toronto, Canada.

September 23, 1994--Invited Speaker. Vascular Surgery Symposium sponsored by New York Medical College. Poughkeepsie, NY.

October 13, 1994--Invited Speaker. Danish Society of Clinical Immunology Consensus Conference on Leukodepletion. Copenhagen, Denmark.

October 22, 1994--Visiting Professor, Departments of Anesthesia, Medicine and Pathology, University of Nebraska. Symposium on Blood Transfusion in Surgery. Omaha, NE.

November 12-17, 1994--Invited Speaker, AABB Workshop Transfusion Medicine 1994 and Beyond (Platelet Transfusion Refractoriness) and Research in Progress Session (Transfusion Immunomodulation). San Diego, CA.

February 2, 1995--Invited Speaker, New York Blood Center Symposium "Leukocyte Reduction in Transfusion Practice," NY, NY.

April 29, 1995--Medical/Surgical Grand Rounds, Sarasota General Hospital, "Risks of Blood Transfusions," Sarasota, FL.

September 13, 1995--Wahle Lecturer- City-Wide Medical Grand Rounds, Roswell Park Memorial Institute & SUNY Buffalo, "Transfusion Immunomodulation," Buffalo, NY.

September 13, 1995--Hematology/Oncology Grand Rounds-- "Current Perspectives in Platelet Transfusion Refractoriness," VA Hospital, Buffalo, NY.

September 14, 1995--Invited Speaker, Cambridge Healthtech Institute & American Red Cross, Symposium on "Leukodepletion of Blood Components: Implications for Transfusion Medicine," Boston, MA.

October 12, 1995--Surgical Grand Rounds, St. Elizabeth's Hospital, "Risks of Blood Transfusion and Alternative Strategies for Managing Anemia," Boston, MA.

October 26, 1995--Invited Speaker, Symposium on Leukodepletion of Blood Components, University of Minnesota and St. Paul American Red Cross, St. Paul, MN.

February 28, 1996--Medical Grand Rounds, Cabrini Medical Ctr., NY, NY. "Recent Advances in Transfusion Support of Patients with Malignancies."

April 26, 1996-- Hematology-Oncology Conference, St. Vincent's Hospital, NY, NY. "Recent Advances in Transfusion Support of Patients with Malignancies."

September 10, 1996--Surgical Grand Rounds, VA Medical Center, Albany, NY. "Alternative Strategies for Treatment of Anemia and Bleeding in Surgical Patients."

September 30, 1996--Grand Rounds, FF Thompson Health System, Inc. "Blood Components for Immunocompromised Patients." Canandaigua, NY

October 14, 1996--Invited Speaker, Research in Progress Session--AABB, Orlando, FL. "Platelet Refractoriness."

October 31, 1996--Grand Rounds, Pathology, SUNY Upstate, Syracuse, NY. "Blood Components Support for Hematologic Malignancies-The Role of Leukodepletion."

December 2-4, 1996--Invited Speaker, Mt. Sinai School of Medicine, Surgical Critical Care Conference, "Transfusion, Leucodepletion and the Surgical Patient," St. Thomas, USVI.

December 6, 1996--Invited Speaker, American Society of Hematology "Super Friday" Satellite Symposium on "Anemia: Time for a Fresh Look at Attitudes, Transfusion Risks and Alternatives." Orlando, FL.

September 6, 1997--Invited Speaker, Institute for Transfusion Medicine/University of Pittsburgh Symposium -- "A New Theory of Transfusion Immunology" Pittsburgh, PA.

December 18-19, 1997--Visiting Professor, Dept. of Pathology, University of South Florida--Moffitt Cancer Center, Tampa, FL. Grand Rounds and informal meetings with residents/faculty.

February 24, 1998--Plenary Lecture, America's Blood Centers Annual Meeting--"Blood Transfusion Immunomodulation, the Silent 'Epidemic'." San Diego, CA.

May 7, 1998--Invited Lecture, Canadian Society for Transfusion Medicine. "ABO Matching and Leukocyte Depletion of Platelet Transfusions for Patients with Hematologic Malignancies." Ottawa, ON, Canada.

June 17, 1998--Invited Lecture, Community Blood Center of Dayton, "Blood Transfusion Immunomodulation, the Silent 'Epidemic'." Dayton, OH.

August 20-22, 1998--Invited Lecture, CAP Conference XXXIII: Transfusion Medicine Performance Improvement. "The Costs of Management Fads and Politically Driven Regulatory Oversight--The Case of Blood Transfusion." San Francisco, CA.

September 11-12, 1998--Third Annual Bloodless Medicine & Surgery Conference, Good Samaritan Hospital. "Transfusion Immunomodulation--The Silent 'Epidemic.'" Los Angeles, CA.

November 3, 1998--Pall Biomedical Symposium at the AABB National Meeting. "Universal Leukocyte Depletion of Transfusions--If Not Now, When?" Phila., PA.

June 17, 1999--Invited Testimony, Proposed Demonstration Projects in Bloodless Medicine & Surgery, State of New Jersey, Dept. of Health & Senior Services, Health Care Administration Board, Jamesburg, NJ.

June 23, 1999--Visiting Professor, Cleveland Clinic, American Red Cross & Case Western Reserve. "Universal Leukoreduction and Transfusion Immunomodulation. Cleveland, OH.

August 9-10, 1999--Expert Panel on Erythropoietin, Johnson & Johnson research advisory program. Princeton, NJ.

December 4, 1999--American Society of Hematology Annual Meeting. Meet-the-Expert Session: "Immunologic Effects of Transfusion," New Orleans, LA.

March 30, 2000--Invited Speaker, "Transfusion Immunomodulation: An Historical Primer," in the Clinical and Molecular Basis of Transfusion-Induced Immunomodulation Symposium, Washington, DC.

April 9, 2000--Invited Speaker, "Transfusion Immunomodulation" in the symposium "In Search of the Zero Risk Blood Supply," American Society of Clinical Pathologists annual meeting. Boston, MA.

May 22, 2000--Visiting Professor and Holbrook Lecturer, "Transfusion Immunomodulation," Medical University of South Carolina, Charleston, SC.

October 19, 2000--Anesthesiology Grand Rounds, "Transfusion Immunomodulation," University of Rochester Medical Center, Rochester, NY.

January 25, 2001--Invited Speaker, "Universal Leukoreduction." HHS Advisory Committee on Blood Safety and Availability. Office of the Surgeon General. Washington, DC.

April 18, 2001--Urology Grand Rounds, "Alternatives to Allogeneic Blood Transfusions." University of Rochester Medical Center, Rochester, NY.

June 29, 2001--Grand Rounds, "Autologous Transfusions." Cayuga Medical Center, Ithaca, NY.

March 15, 2002--Invited Speaker on the occasion of the retirement of Alfred J. Katz MD, "A New Theory of Transfusion Immunology," Holland Laboratory, American Red Cross, Rockville, MD.

March 21, 2003--Pathology and Laboratory Medicine Grand Rounds. "Clinical and immunologic aspects of transfusion immunomodulation." Virginia Commonwealth University (Medical College of Virginia), Richmond VA.

September 13, 2003--Society for the Advancement of Blood Management Annual Meeting. "Transfusion, immunomodulation and inflammation." San Diego, CA

September 19, 2003--American Society of Clinical Pathology Annual Meeting. "Best of the American Journal of Clinical Pathology." One of the five best papers from the 2002 AJCP, selected for presentation and discussion at the annual meeting of the ASCP. "Leukoreduction of transfusions in cardiac surgery." New Orleans, LA.

September 23, 2004--Indiana Blood Center. "Leukoreduction of Blood Transfusions and Clinical Outcomes." Indianapolis, IN.

October 25, 2004--American Association of Blood Banks Annual Meeting. "The platelet as an inflammatory cell." Baltimore, MD.

December 14, 2004 – Medical Grand Rounds, University of Rochester Medical Center – “Blood transfusions, helpful or harmful?”

April 25, 2005 – California Blood Bank Society Annual Meeting. “The platelet as an inflammatory cell.” Anaheim, CA

May 18, 2005 – Blood Bank Association of New York State Annual Meeting. “The platelet as an inflammatory cell – implications for vascular and transfusion medicine.” Verona, NY.

March 31, 2006 – AABB Perioperative Conference – Deleterious clinical effects of transfusion immunomodulation – proven beyond a reasonable doubt. Dallas, TX.

April 12, 2006 – Rochester General Hospital-Hematology-Oncology Conference – “How I approach the prevention and treatment of platelet transfusion refractoriness.”

April 26, 2006 – Visiting Professor, University of Pittsburgh, Hematology-Oncology

May 11, 2006 – Visiting Professor, University of North Carolina, Pathology and Laboratory Medicine, Chapel Hill, NC

September 9, 2006 – Visiting Professor, Medical College of Virginia, Richmond, VA.

February 21, 2007 – “Immunomodulation by transfusion,” Navigant Corp., Lakewood, CO.

May 9, 2007 – “Immunomodulation by transfusion,” Transfusion Medicine and Cellular Therapeutics Branch, Division of Blood Diseases and Resources, National Heart, Lung, and Blood Institute, NIH, Bethesda, MD.

October 31, 2007 – “ABO and clinical outcomes in transfusion medicine,” Transfusion Medicine and Cellular Therapeutics Branch, Division of Blood Diseases and Resources, National Heart, Lung, and Blood Institute, NIH, Bethesda, MD.

June 5, 2008 – Blood Bank Association of New York State Annual Meeting. “Hemovigilance – What is it? Why should you care?” Verona, NY

June 16, 2008 – “Platelets and Inflammation.” Thrombosis and Hemostasis Branch, DBDR, NHLBI, NIH, Bethesda, MD.

November 20, 2008 – “Transfusion Immunomodulation: Evolving Concepts in Patient Outcomes.” American Red Cross Seminar, Worcester, MA.

January 13, 2009 – “To Transfusion or Not Transfuse.” Medical Grand Rounds, Univ. Rochester Medical Center, Rochester, NY.

May 4, 2009 – “Transfusion Medicine’s Second Century: A Paradigm Shift in Progress.” Peter Jatlow Symposium, Dept. of Laboratory Medicine, Yale University School of Medicine, New Haven, CT.

May 30, 2009 – “Transfusion reactions, platelet refractoriness and supportive care of oncology patients.” American Society of Clinical Oncology (ASCO) Annual Meeting, Clinical Education Session, Orlando, FL.

July 29, 2009 – “TRALI – how to prevent it.” Pall Biomedical Corp. Working Group, Roslyn, NY.

September 14-15, 2009 – NHLBI State of the Science Working Group on Transfusion Medicine, Hemostasis & Thrombosis. Invited participant. Bethesda, MD.

October 25, 27, 2009 – AABB Symposia on “Transfusion Associated Thrombosis/Inflammation/Immunomodulation” (Chair/Speaker) and “Platelet Transfusion Refractoriness” (Speaker). New Orleans, LA.

October 10, 2010 – AABB Seminar “Platelet Transfusion” (Speaker). Baltimore, MD.