

## **CURRICULUM VITAE**

### **Julie Anne Sanford Biggerstaff, PhD**

#### **EDUCATION**

BA, Molecular, Cellular and Developmental Biology, Univ. of Colorado  
Boulder, Colorado, 1981

MS, Human Genetics, University of Texas, Grad. School of Biomedical Sciences  
Houston, Texas, 1983

PhD, Human Genetics, University of Texas, Grad. School of Biomedical Sciences  
Houston, Texas 1987

#### **POSTGRADUATE TRAINING**

Predoctoral Fellow  
American Legion Auxiliary, University of Texas, GSBS, M.D. Anderson Cancer Center., Dept. of Cell  
Biology, Houston, Texas, 1983-1987

Postdoctoral Fellow  
Laboratory for Genetic Services, Baylor College of Medicine  
Houston, Texas, 1988

Research Postdoctoral Fellow  
Department of Pediatrics, Division of Medical Genetics, Univ. of Texas Medical School  
Houston, Texas, 1988-1990

#### **PROFESSIONAL APPOINTMENTS**

Director, Cytogenetics  
Hematologics, Inc.  
Seattle, WA  
March 2009 - present

Director, Virtual Genetics  
Pathology Associates Medical Laboratory  
Spokane, WA  
December 2007- present

Consultant Director  
Signature Genomic Laboratories, LLC  
Spokane, WA  
January- December 2008

Director, Cytogenetics  
Idaho Cytogenetics Diagnostic Laboratory  
Boise, Idaho  
July, 2002-present

Director, Cytogenetics  
Sacred Heart Medical Center  
Spokane, Washington  
September, 1997-September, 2007

Director, Cytogenetics  
Genzyme Genetics  
1993 - July, 1997

Adjunct Faculty  
Houston Community College  
Houston, Texas, 1990

Clinical Scientist  
Division of Cytogenetics  
Duncan Guthrie Institute of Medical Genetics Glasgow University  
Glasgow, Scotland, 1992

## **CERTIFICATION**

American Board of Medical Genetics  
Clinical Cytogenetics - 1990

## **MEMBERSHIPS**

American Society of Human Genetics  
American College of Medical Genetics – Fellow  
American Board of Medical Genetics  
American Cytogenetic Conference Group  
Sigma Xi

## **PROFESSION-RELATED ACTIVITIES**

Eastern Washington University, College of Science, Health and Technology Advisory Board  
2007 to the present  
Genetic Advisory Committee, Division Maternal and Child Health, State of Washington,  
1998 to 2009  
President of the committee, 2001 to 2004  
Chairperson, March of Dimes Program Services, Inland Northwest Division, 1998 to 2005  
Member, Genetics Task Force, Dept. of Health, State of WA, 2002  
Ethics and Moral Perspectives Committee Member, Sacred Heart Medical Center  
2004 to 2007

## **PUBLICATIONS**

### **ARTICLES - REFERRED JOURNALS**

Teeter LD, **Sanford JA**, Sen S, Stallings RL, Siciliano MJ, Kuo MT: "Multidrug Resistant Phenotype Co-Segregates with an Amplified Gene in Somatic Cell Hybrids of Drug Resistant CHO and Sensitive Murine Cells", "Molec and Cell Biol, 6:4268, 1986.

**Sanford JA** and Stubblefield E: "General Protocol for Microcell-Mediated Chromosome Transfer", Somatic Cell and Molec Genet, 13:279, 1987.

Stubblefield E and **Sanford JA**: "A General Survey of Genetics and Cancer", Anticancer Research, 7:1085, 1987.

**Sanford JA** and Stubblefield E: "Human Oncogenes in Mouse/Human Microcell Hybrids", Oncogene Res, 4:195, 1989.

Aulthouse AL, Beck M, Griffey E, **Sanford J**, Arden K, Machado MA, Horton WA: "Expression of the Human Chondrocyte Phenotype in Vitro", (In Vitro) Cell and Dev Biol, 25:659, 1989.

Yang F, Friedrichs WE, Cupples RL, Bonifacio MJ, **Sanford JA**, Horton WA, Bowman BH: "Human Ceruloplasmin: Tissue-Specific Expression of Transcripts Produced by Alternative Splicing." J Biol Chem 266(18):10780, 1990.

**Hanna JS**, RL Neu and JR Barton: "Difficulties in Prenatal Detection of Mosaic Trisomy 8." Prenatal Diagnosis, 15(12):1196-1197, 1995.

Pardo Julio M and **Julie Sanford Hanna**: "Balanced X-autosome Translocation in a Girl with Short Statue and Ovarian Dysfunction: Response to One Year of Growth Hormone Treatment." Int'l J Ped, 11(1), 1996.

**Sanford Hanna J**, Richard L Neu and David H Lockwood: "Prenatal Cytogenetic Results from Cases Referred for 44 Different Types of Abnormal Ultrasound Findings." Prenatal Diagnosis, 16:109, 1996.

Heuther Carl A, Rebecca Martin, Susan Stoppelman, Sharon D'Szoua, Jennifer Bishop, Claudine Torfs, Fred Lorey, Kristin May, **Julie Sanford Hanna**, Patricia Baird and JoAnn Kelly. "Sex Ratios in Fetal and Livebirth Autosomal Aneuploids." J Med Genetics, 63:492, 1996.

**Sanford Hanna J**, Shires P, Matile G.: "Trisomy 1 in a Clinically Recognized Human Pregnancy." Am J Med Genetics, 68(1):98, 1997.

Estabrooks, L.L., **J. Sanford Hanna**, A.N. Lamb: "Overwhelming Maternal Cell Contamination in Amniotic Samples from Patients with Oligohydramnios Can Lead to a False Positive Interphase FISH Results." Prenatal Diagnosis, 19:178, 1999.

**Sanford-Hanna, Julie A**, Ball, S., Pagan, R.A., Donlan, M: "Mother to son transmission of del(1)(q42.1q42.3)." Am. J. Med. Genetics, 98:103, 2001.

DeTar, Mike, **Sanford Biggerstaff, J.**, "Congenital Renal Rhabdoid Tumor with Placental Metastases: Immunohistochemistry, Cytogenetic, and Ultrastructural Findings", Pediatric and Developmental Pathology, 9(2):161, 2006.

DeTar, Mike, **Sanford Biggerstaff, J.**, "Congenital Trisomy 21 associated Myeloproliferative Disease: Diagnostic Placental Pathology with Confirmation by FISH (fluorescent in situ hybridization)" in preparation.

**Sanford Biggerstaff, J.**, Liu, W., Slovak, M.L., Bobadilla, D., Bryant, E., Glotzbach, C., and Shaffer, L. G. "A dual color FISH assay distinguishes between ELL and MLLT1 (ENL) gene rearrangements in t(11;19) positive acute leukemia", Leukemia, 20:2046, 2006.

Mikhail, F. M., Sathienkikhanchai, A., Robin, N.H., Prucka, S., **Sanford Biggerstaff, J.**, Komorowski, J., Andersson, R., Bruder, C.E.G., Piotrowski, A., Dian de Stahl, T., Dumanski, J.P. Carroll, A.J. "Overlapping phenotype of Wolf-Hirschhorn and Beckwith-Wiedemann Syndromes in a girl with der(4)t(4;11)(pter;pter)", Am. J. Medical Genetics, Aug 1;143(15):1760-6, 2007

Tsuchiya, K.D., Shaffer, L.G., Aradhya, S., **Sanford Biggerstaff, J.**, Gastier-Foster, J., Patel, A., Rudd, M.K., Sanger, W., Schwartz, S., Tepperberg, J., Thorland, E., Torchia, B., Brothman, A.R. "Variability in Interpreting and reporting copy number changes detected by array-based technology in Clinical Laboratories" Genetics in Medicine, 11:866, 2009.

Cutler, J.A., Wells, D.A. van de Loosdrecht, A.A., deBaca, M.D., Kalnosky, M.H., Zehantner, B., Eidenschink, L., Ghirardelli, K.M., **Sanford Biggerstaff, J.**, Loken, M.R., "Phenotypic abnormalities strongly reflect genotype in patients with unexplained cytopenias" Clinical Cytometry, 2010, Dec 23, epub..

**L. Hartmann, J. Sanford Biggerstaff**, D. Chapman, J. Scott, K. Johnson, K. Ghirardelli, W. Fritschle, D. Martinez, R. Bennington, M. DeBaca, D. Wells, M. Loken, B. Zehantner., "Detection of genomic abnormalities in Multiple Myeloma: The application of FISH analysis in combination with various plasma cell enrichment techniques", accepted, Am. J. Clinical Pathology, 2011.

## ARTICLES - NON-REFERRED JOURNALS/Other

**Sanford Hanna, Julie:** "Analysis of Products of Conception: Cytogenetic and Laboratory Perspectives." The Genetic Viewpoint, 3(1):3, 1996

**Sanford Hanna, Julie:** Genetics related topic articles for "Scope", the Sacred Heart Medical Center Physician newsletter, published bi-monthly, 1997 to 2006.

**Sanford Biggerstaff, Julie:** Genetics related hot topic articles for PAML web-site genetic pages 2007 to present.

## ABSTRACTS

**Sanford JA** and Stubblefield E: "Microcell-Medicated Chromosome Transfer Using a Human Lymphoblast Cell Line as the Chromosome Donor." AM J Hum Genet, 35(6):151A, 1983.

**Sanford JA** and Stubblefield E: "Comparison of Microcell Mediated Chromosome Transfer and DNA Transfection for Detecting Transforming Genes on Chromosomes of Human Tumor Cell Lines." AM J Hum Genet, 39(3):41A, 1986.

Ellard JT, Machado MA, **Sanford JA**, Putnam EA, Campbell DF, Horton WA: "Comparative Studies of In Vivo and In Vitro Human Chondrocytes." Texas Soc. for Electron Microscopy, Austin, TX, March, 1989.

Horton WA, **Sanford JA**, Ellard J: "Expression of the Cartilage Matrix Fibril Dysplasia (CMFD) Chondrodysplasia Phenotype in Vitro." David Smith Meeting, Madrid, Spain, March 1989.

**Sanford JA**, Ellard J and Horton WA: "Type II Collagen Abnormalities in a Bovine Model of a Chondrogenesis Type II (Langer-Saldino)." Am J Hum Genetics, 49(4):239A, 1989.

**Sanford Hanna J** and Lockwood D: "A Retrospective Study of Risks for Chromosome Abnormality with Hydrops and Associated Anomalies." Am J Hum Genet, 53(3):598, 1993.

Benn P, Craffey A, Ciarleglio L, Lamb A, **Sanford Hanna J**, Krasikov N: "Maternal Serum Triple Screening for Down Syndrome (DS) may also preferentially Identify some Fetuses with Supernumerary "Marker" Chromosomes (SMCs)." Am J Hum Genet, 53(3):1382A, 1993.

Murphy RA, **J. Sanford Hanna** and P Bayliss: "Prenatal detection of a unique case with unbalanced mosaic cell lines." Applied Cytogenetics, 20(3):89, 1994.

Neu RL, **Sanford Hanna J** and Lockwood D: "Cytogenetic Laboratory Experience with 2,378 Early Amniotic Fluid and 3669 Chorionic Villi Specimens." 7th International Conference on Early Prenatal Diagnosis, Israel, May 1994.

**Hanna JS**, BA Allitto, M St Amant, FH Coleman and AN Lamb: "Prenatal diagnosis of satellited Yp: Clinical significance and report of two cases." Second Joint Clinical Genetics Meeting - 26th Annual March of Dimes Clinical Genetics Conference and American College of Medical Genetics Second Annual Meeting, March 6-9, 1995, Los Angeles, CA.

**Sanford Hanna J**, PM Shires and G Matile: "Trisomy 1 in a spontaneous pregnancy loss at 9 weeks gestation." Second Joint Clinical Genetics Meeting - 26th Annual March of Dimes Clinical Genetics Conference and American College of Medical Genetics Second Annual Meeting, March 6-9, 1995, Los Angeles, CA.

Elliott CM and **JS Hanna**: "Fetal Demise Specimens: Failure and abnormality rates of amniotic fluid specimens and products of conception over a seven year period." Applied Cytogenetics, 21(3)110, 1995.

Schaefer NM, JA Higgins and **JS Hanna**: "Maternal inheritance of a pericentric inversion of chromosome 11 resulting in Beckwith-Wiedemann syndrome." Applied Cytogenetics, 21(3)89, 1995.

Medina MJ, RA Murphy and **J Sanford Hanna**: "Prenatal Diagnosis of Prader-Willi/Angelman syndrome with a de novo t(15;17)." Applied Cytogenetics, 21(3)88, 1995.

**Sanford Hanna J**, L Estabrooks, K Hire, J Sandow and S Roaf: "De novo complex chromosome rearrangements in a products of conception specimen." Am J Hum Genetics, 57(4):A125, 1995.

Schaefer N, S Mundt, D Lieberson, P Fairbrother and **J Sanford Hanna**: "Prenatal diagnosis of 11p15.3 rearrangements: laboratory experience and a report of three cases." Am J Hum Genetics, 57(4):A288, 1995.

Lamb AN, M Pettenati, **J Sanford Hanna**, N Krasikov, R Neu, N Rao, M Weinstein, J Weiser and L Estabrooks: "Six cases of satellited long arm of chromosome 2 detected during prenatal chromosome diagnosis." Am J Hum Genetics, 57(4):A282, 1995.

Olney PN, J Korotkin, **J Sanford Hanna**, A Lamb, BA Allitto, R Hirsch and K Kupke: "Prenatal diagnosis of a 46,XX male with the SRY probe and FISH." Am J Hum Genetics, 57(4):A286, 1995.

Clark BA, A Foster, CA Crowe, GG Ashmead, J Steward, JJ Weiser and **J Sanford Hanna**: "Triple mosaic aneuploidy at amniocentesis and phenotypically normal pregnancy outcome." Am J Hum Genetics, 57(4):A277, 1995.

Priest JH, WR Adams, **J Sanford Hanna**, HH Hobart, DF Saxe, T Sanders, L McGavran, AA Perszyk, EB Spector and JF Stone: "The nature of recurrent triploidy in humans." Am J Hum Genetics, 57(4):A123, 1995.

Mulla WR, R Kline, A Genin, DAH Whiteman, MD Jones, EB Rand, **J Sanford Hanna** and NB Spinner: "Chromosome 20 Deletions: molecular cytogenetic analysis and correlation with phenotype." Am J Hum Genetics, 57(4):A121, 1995.

Estabrooks, LL, CH Lytle, M Sapeta, J Sandow, J Takacs, **J Sanford Hanna**, R Neu, J Weiser, B Ward, K Rao, A Lamb: "Partial Aneuploidy detected by Prenatal Interphase FISH Analysis." Am J Hum Genetics, 59(4):A2090, 1996.

**Sanford Hanna, J.**, K. Waters, and W. Busch. "Prenatally Detected Interstitial Deletion 6q and Clinical Outcome." 28th Annual March of Dimes Clinical Genetics Conference and ACMG 4th Annual Meeting, February, 1997, FT. Lauderdale, FL.

**Sanford Hanna, J.**, K. Dasse, D. Eller, P. Rogers and G. Webb. "Prenatal Diagnosis of Mosaic Denovo Trisomy 1q." 28th Annual March of Dimes Clinical Genetics Conference and ACMG 4th Annual Meeting, February, 1997, Ft. Lauderdale, FL.

Takacs, J., M. Kaemper, J. Weiser, and **J. Sanford Hanna**. "Mosaic Deletion 9q31: True Mosaicism or an Extreme Case of Fragile Site Expression". Assoc. Genetic Technologists Meeting, June, 1997. Applied Cytogenetics, 1997.

George L, **Sanford Hanna J**, Shaffer LG, and N Asterbadi: "A Prenatal Example of Extreme Pseudomosaicism?" AJHG, 61 (4): A874, 1997.

**Sanford Hanna J**, J Takacs, JJ Weiser, MK Runde, S Mundt: "Frustrating Fragile Sites: Mosaic Deletions in Prenatal Studies." AJHG,61(4): A926, 1997.

**Sanford Hanna, J.**, Gaskin, S., and Martin, J: "Detection of Tissue-limited Mosaicism: A Case report of Mosaic Trisomy 12" American Cytogenetics Conference, Santa Fe, NM, April, 2002.

Patternson, Lynda, Timm, Nadine, Holquin, Rafael, **Hanna, J.S.**, "The Importance of Routine Chromosome Analysis screening in Infertility Clinic Patients" Association of Genetic Technologists meeting, Spring, 2003.

Holquin, Ralf, **Sanford Hanna, J.**, "Issues with FISH probe Validation" American Cytogenetics Conference meeting,

Stevenson, WA, April 2004.

**Sanford Biggerstaff, J.**, Liu, W., Glotzbach, C., Shaffer, L.G., “Development and Clinical Validation of a “Home-Brew” Dual-Color FISH probe assay to differentiate between ELL and ENL gene rearrangement in Leukemia”. American Society of Hematology Meeting, Atlanta, GA, December, 2005.

Sathienkijkanchai<sup>1</sup>, N.H. Robin<sup>1</sup>, S. Prucka<sup>1</sup>, **J.S. Biggerstaff<sup>4</sup>**, J. Komorowski<sup>3</sup>, R. Andersson<sup>3</sup>, C. Bruder<sup>1,2</sup>, A. Piotrowski<sup>1,2</sup>, T. Diaz de Stahl<sup>2</sup>, J.P. Dumanski<sup>1,2</sup>, A.J. Carroll<sup>1</sup>, F.M. Mikhail<sup>1</sup>.” “Combined phenotype of Wolf-Hirschhorn and Beckwith-Wiedemann Syndromes in a female with der(4)t(4;11)(pter;pter)” ASHG, October 2006.

Johnson, E.V., Huber, S., Liu, W., **Sanford Biggerstaff, J.**, Laffin, J., Raca, G., Dyer Montgomery, K., “Two different t(11;19)—Subtle cytogenetic variation with marked clinical differences”. Assoc. Genetic Technologist meeting, Denver, June, 2007.

Sol-Church, K., Stabley, D.L., Conard, K., Nicholson, L, **Sanford Biggerstaff, J.**, Liu, W., Campbell, J.B., Meyer, W.H., Gripp, K.W. “LOH of maternal alleles on chromosome 11 is associated with aggressive ERMS in two patients with Costello Syndrome” Am. Society of Human Genetics meeting, San Diego, CA October 2007.

Cutler, Jevon et al., “Flow Cytometric Scoring System Strongly Correlates Phenotype with Genotype in Patients with Unexplained Cytopenias” XXV Congress of the International Society for Advancement of Cytometry, Seattle, WA, May 2010.

**Sanford Biggerstaff, JA.**, Martinez, D., Ellsworth, K., Schutter, E., Hunter, K., Gu, S., Berkley, J., Moroz, L. Lee, E-J. “Use of Technology as an Aid in Cytogenetics laboratory Workflow Efficiency” American College of Medical Genetics meeting, Vancouver, BC, March, 2011.