

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME Micheler Ricardo Richardson	POSITION TITLE Professor of Biology and Director
eRA COMMONS USER NAME (credential, e.g., agency login) mrrichardson	

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
Universitat Autònoma de Barcelona	B.S.	1983	Biology
Universitat Autònoma de Barcelona	M.S.	1984	Biochemistry
Universitat Autònoma de Barcelona	Ph.D.	1988	Biochemistry

Personal Statement

Chemokines are multifunctional mediators that play key roles in many acute and chronic inflammatory diseases including rheumatoid arthritis and asthma, and mediate tumor cell trafficking and metastasis. These functions are mediated via specific G-protein coupled receptors. Chemokine receptor functions are also modulated by various adaptor/scaffold proteins. A long-term goal of my laboratory is to delineate the molecular mechanisms by which chemokine receptors trigger selective responses to mediate tumor growth and metastasis. Our studies focus on several accessory molecules including, G proteins, specific kinases and phosphatases, beta-arrestins and activators of G protein signaling. Deciphering the role of these molecules in cancer development and metastasis will help understand the disparity in cancer outcomes in African American versus Caucasian, and provide new targets for therapeutic intervention against cancer. The students and postdoctoral fellows in training in the laboratory benefit from our interdisciplinary approaches to understand tumor development and invasion as well as some of the risk factors associated to cancer disparities. Our efforts are supported by several grants NCI, NIAID and DOD. The partnership with the Lineberger Comprehensive Cancer Center established through the U56 mechanism have allowed North Carolina Central University to increase the number of scientists and laboratories dedicated to cancer research, and to broaden the collaboration with UNC-Chapel Hill in the fight against cancer.

B. Positions and Honors

- July 89 – Aug 92: Research Associate. Northwestern University, Dept. of Pharmacology, Chicago, IL.
- Sept. 92 - Aug 00: Assistant Research Professor; Dept. of Medicine, Duke Medical Center, Durham, NC.
- Sept. 00 -May 02: Associate Research Professor; Dept. of Medicine, Duke Medical Center, Durham, NC.
- May 02 - June 04: Associate Professor; Dept. of Biochemistry, Meharry Medical College, Nashville, TN.
- June 04 -Present: Professor of Biology and Director JLC/BBRI Cancer Research Program, North Carolina Central University, Durham, North Carolina.
- September 04 - Present: Adjunct Professor; Department of Medicine, Duke Medical School, Durham, NC.
- March 05-Present: Adjunct Professor; Department of Pharmacology, University of North Carolina, Chapel Hill
- 2005-2009: Regular member Innate Immunity and Inflammation (III)
- 2005 : Microbiology, Infectious Diseases and AIDS Initial Review Group (ad hoc)
- 2007: Comprehensive Minority Institute Cancer Center Partnership (ad hoc)
- 2009: NIH Supported Centers for Population Health and Health Disparities (ad hoc)
- 2010: Immunology Fellowship AREA
- 2006-10: Triangle Community Foundation (Elion/Hitchings Scholarship)
- 2008- present:The Melanoma Research Foundation (ad hoc)
- 2010-12: Member of the new College of CSR Reviewers (NIH),

C. Selected Peer-reviewed Publications from >60

Richardson, RM, Pridgen, BC, Haribabu, B., and Snyderman, R. Regulation of the human chemokine receptor CCR1: cross-regulation by CXCR1 and CXCR2. (2000) *J Biol Chem.* 275, 9201-9208. PMID: 10734056.

Richardson, R. M., Marjoram, R.J., Barr, A., and Snyderman, R. (2001) Inhibition of the PAF receptor by RGS4 Requires the Receptor's Cytoplasmic Tail. *Biochemistry*, 40: 3583-3588. PMID: 11297424

Fong, AM., Premont, R, Richardson, RM, Yu, AM, Lefkowitz, R.J., and Patel D. (2002). Defective lymphocyte chemotaxis in β -arrestin2 and GRK6-deficient mice. *PNAS.* 99, 7478-7483. PMID: 12032308

Richardson, R. M., Marjoram, R. J., Barak, L., and Snyderman R. Role of the Carboxyl-terminus of CXCR1 and CXCR2 on IL-8-mediated Leukocyte functions. (2003), *J. Immunol.*, 70, 2904-2911. PMID: 12626541

Richardson, R. M., Tokunaga, K, Marjoram, M.J., Sata, T., and Snyderman R. Interleukin-8 mediated heterologous receptor internalization provides resistance to HIV-1 infection: Role of signal strength and receptor desensitization. (2003). *J. Biol. Chem.*, 278, 15867-15873. PMID: 12594210.[

Miyazaki, D., Nakamura, T, Toda, M., Cheung-Chau, K-W., Richardson, R. M. and Ono, S. J. Co-stimulation of mast cells via CCR1 required for mast cell degranulation and allergic responses in vivo. (2005) *J. Clinical Investigation* 115:434-442. PMID: 15650768

Nasser, M. W., Marjoram, R. J., Raghuwanshi, S. K., Brown, S., and Richardson, R. M. Protein Kinase C-epsilon mediates cross-desensitization among CXCR1, CXCR2 and CCR5. (2005) *J. Immunol.*, 174 6927-6933. PMID: 15905535

Su, Y., Raghuwanshi, S. K., Yu, Y, Nanney L. B. Richardson R. M and Richmond A. β -arrestin-2 knockout promotes neovascularization and re-epithelialization in mouse excisional wounds (2005) *J. Immunol.*, 175 5396-5402. PMID: 16210646

Brown, S. L., Jala, V. R., Raghuwanshi, S. K., Nasser, M. W., Haribabu, B. and Richardson, R. M. Activation and regulation of platelet-activating factor receptor: role of G_i and G_q in receptor-mediated chemotactic, cytotoxic and cross-regulatory signals (2006) *J. Immunol.*, 177: 3242 – 3249. PMID: 16920964

Nasser M. W., Raghuwanshi S. K., Malloy, K. M., Shim, J., Rajarathnam K., and Richardson, R. M. CXCR1 and CXCR2 activation and regulation: Role of aspartate 199 of the second extracellular loop of CXCR2 in CXCL8-mediated rapid receptor internalization. (2007) *J. Biol. Chem* 282: 6906 – 6915. PMID: 17204468

Raghuwanshi S. K., Nasser M. W., Malloy K. M., Chen, X L., Strieter, R. M., and Richardson, R. M. β arrestin-2 modulates tumor development, invasion and metastasis: Distinct role of CXCR2 and NF- κ B. (2008). *J. Immunol.*, 180:5699-5706. PMID: 18390755

Nasser MW, Raghuwanshi SK, Grant DJ, Jala VR, Rajarathnam K, Richardson RM. (2009) Differential activation and regulation of CXCR1 and CXCR2 by CXCL8 monomer and dimer. *J Immunol.* 183:3425-32. PMID: 19667085

Toda, M., Kuo, CH., Borman, SK., Richardson, RM., Inoko, A., Inagaki, M., Schneider, K., Ono, SJ. Evidence That Formation of Vimentin·Mitogen-activated Protein Kinase Complex Mediates Mast Cell Activation following Fc ϵ RI/CC Chemokine Receptor 1 Cross-talk. (2012). *J. Biol. Chem.* 287: 24516-24524 PMID:22613718

Grant DJ, Hoyo C, Oliver SD, Gerber L, Shuler K, Calloway E, Gaines AR, McPhail M, Livingston JN, Richardson RM, Schildkraut JM, Freedland SJ. Association of Uridine Diphosphate-Glucuronosyltransferase 2B Gene Variants with Serum Glucuronide Levels and Prostate Cancer Risk. (2012). *Genet Test Mol Biomarkers.* (2012) PMID:2309824

Raghuwanshi SK, Su Y, Singh V, Haynes K, Richmond A, Richardson RM. The chemokine receptors CXCR1 and CXCR2 couple to distinct G-protein-coupled receptor kinases to mediate and regulate leukocyte functions. (2012) *J. Immunol.* 15;189(6):2824-32. PMID:22869904

Raghuwanshi SK, Smith N, Rivers EJ, Thomas AJ, Sutton N, Hu Y; Mukhopadhyay S, Chen, XL, Leung T, and Richardson RM. GRK6 deficiency promotes angiogenesis, tumor progression and metastasis (2013) *J. Immunol.* 190:5329-5336 PMID:

Singh V, Raghuwanshi SK, Smith K, Rivers EJ, and Richardson MR. G-protein-coupled receptor kinase-6 interacts with Activator of G-protein signaling-3 to regulate CXCR2-mediated cellular functions (2013) *J. Immunol.* (Accepted, pending minor revision)

Joseph PRB, Poluri KM, Gangavarapu P, Rajagopalan L, Raghuwanshi S, Richardson RM, Garofalo RP and RajarathnamProline K. Mutagenesis as a Strategy for Design of Monomeric Proteins (2013) *Biophysical Journal.* (in press)

D. Research Support

Ongoing Research Support

1U54 CA-92077 Richardson (PI) 09/01/10-08/31/15
NIH/NCI

NCCU-BBRI-Lineberger Partnership in Cancer Research

The objectives are: (1) To expand research collaborations among the two institutions; (2) To use research activities in and outside the U54 mechanism to train students and junior/mid-level faculty in multidisciplinary research aimed at reducing cancer disparities; and (3) To expand and consolidate programs of community outreach and education. The strengths of each institution are uniquely positioned to overcome the weaknesses found in the other to achieve these priorities.

RO1-AI-38910 Richardson (PI) 6/1/02-1/31/13
NIH/NIAID

Regulation of Chemokine Mediated Leukocyte Functions

The overall objective of this proposal is to define the molecular mechanisms via which GRK6, AGS3 and β arrestin 1 & 2 modulate CXCR1 and CXCR2 activation and regulation.

Completed Research Support

W81XWH-07-1-0418 Richardson (PI) 5/18/07-06/18/10
DOD USAMRMC

NCCU/BBRI-Duke/Urology Partnership in Prostate Cancer Research

The long-term objective of this partnership is to reduce prostate cancer disparity by developing innovative approaches for prevention, detection, and treatment of prostate cancer.

1U56 CA-92077 Richardson (PI) 5/11/01-04/30/10
NIH/NCI

NCCU-BBRI-Lineberger Partnership in Cancer Research

The major goal of this NCI-funded Cooperative Planning Grant (U56) for Comprehensive Minority Institution/Cancer Partnership is to expand the Partnership between NCCU and through a series of linked gateway pilot initiatives, accompanied by technology transfer, that lead toward a major collaborative research project (with outreach/health education components) a population-based cohort study of prostate cancer in African-American men.

P20 MD000175 Kimbro (PI) 9/1/07-05/30/12
NIH NCMHD

NCCU EXPORT Center of Excellence

The major goals of this project are to determine the Roles of Inflammation and Androgen Metabolism in Prostate Cancer Disparity

W911NF-09-2-0047 Richardson (PI) 08/10/2009 – 08/09/2012
USAMRMC

Monitoring Cell-Based Transducer for the Detection of Bioagents

The overall goal of this proposal is to design and generate plasmids coding the components for cell-based sensor platforms to study the signaling properties for GPCRs. The cell-based reporters used in these sensor platforms will use G-protein coupled receptors (GPCRs) as sensing elements and will generate bioluminescent signals as readouts.