BIOGRAPHICAL SKETCH	
NAME Liza Makowski Hayes a.k.a. “Liza Makowski”	POSITION TITLE Assistant Professor
eRA COMMONS USER NAME (credential, e.g., agency login) hayes089	

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	MM/YY	FIELD OF STUDY
Boston College, Chestnut Hill, MA	BS	09/90-06/94	Biology
Harvard Medical School, Boston, MA	MM	06/98-06/99	Medical Sciences
Harvard School of Public Health, Boston, MA	PhD	09/96-06/03	Nutritional Biochemistry
Harvard School of Public Health, Boston, MA	Post-doc	07/03-10/04	Nutritional Biochemistry
Duke University, Durham, NC	Post-doc	11/04-09/09	Nutritional Biochemistry and Metabolism

A) PERSONAL STATEMENT

Liza Makowski is an assistant professor of Nutrition, Division of Nutrition Biochemistry in the Departments of Nutrition and Medicine at the UNC Gillings School of Global Public Health and the UNC School of Medicine. She earned a Ph.D. in the Department of Nutrition at the Harvard School of Public Health and a Masters in Medicine concurrent with her Ph.D. studies as a Lucille P. Markey Fellow from Harvard Medical School. Liza completed postdoctoral studies in the Departments of Medicine and Pharmacology & Cancer Biology at the Duke University Stedman Center for Nutrition and Metabolism. Dr. Makowski has expertise in metabolism, inflammation, mouse models, macrophage biology, and nutrient sensitive signaling pathways. The research focus of the Makowski Lab (http://makowskilab.web.unc.edu/) is to understand metabolic reprogramming of immune cells wherein the goal is to identify novel pathways to manipulate substrate metabolism in immune cells in efforts to limit the pathogenesis of complex diseases such as obesity and diabetes. Dr. Makowski has received multiple grants including a Pathway to Independence NIH K99/R00 award to investigate macrophage mitochondria’s role in metabolism and inflammation. She is currently PI on an NIH R21 Provocative Question Grant and a Mary Kay Foundation grant to study obesity and breast cancer risk, and an American Heart Association grant to study substrate metabolism in macrophage biology. Her ultimate aim is to find relevant metabolically sensitive pathways in her model systems, observe parallels in human populations, and identify targets to reprogram immune cells that will restore tissue homeostasis thereby reducing progression of obesity and cancer.

B) POSITIONS, MEMBERSHIPS, AND HONORS

Positions and Employment

2003 - 2004 **Harvard School of Public Health,** Boston, MA
Postdoctoral Fellow - Department of Genetics and Complex Diseases

2004 - 2009 **Duke University, Stedman Center for Nutrition and Metabolism,** Durham, NC
Postdoctoral Fellow - Department of Medicine, Division of Endocrinology

2010 - **UNC Gillings School of Global Public Health**, Chapel Hill, NC
Assistant Professor – Department of Nutrition, Division of Biochemistry

Other Experience and Professional Memberships

Member of Centers at UNC: Nutrition Obesity Research Center, McAllister Heart Institute, Lineberger Comprehensive Cancer Center, Center for Environmental Health and Susceptibility, Center for Gastrointestinal Biology and Disease.

Societies: American Diabetes Association, Triangle Immunology Interest Group, Society for Leukocyte Biology, Obesity Society, American Society for Nutrition, American Heart Association, The American Society for Biochemistry and Molecular Biology

Honors and Awards

2000 Harvard Graduate Student Council Grant - Keystone Obesity and Diabetes Meeting. Taos, NM.
Keystone Grant - Keystone Obesity and Diabetes Meeting. Taos, NM.

Gordon Grant - Gordon Atherosclerosis Conference, NH.

2001 Harvard School of Public Health - Faculty Council Research Poster Contest, 1st prize.

2001 - 03 Junior Investigator Fellowship - Kern Aspen Lipid Conference. Aspen, CO.

2003 Harvard School of Public Health - Division of Biological Sciences
Dr. Edgar Haber Award in Biological Sciences for recognition of outstanding original and creative thesis work.

2003 Society for Leukocyte Biology 2003 Presidential Award for Research, 2nd place. 36th Annual Meeting for the SLB: Unraveling Inflammation. Philadelphia, PA.

2005-06 Preparing Future Faculty Fellow - Council of Graduate Schools, American Association of Colleges & Universities, & Duke University

2006 Keystone Grant – Keystone Obesity and Diabetes Meeting. Vancouver, CA.

2007-08, '11 Early Career Investigator Award. Kern Lipid Conference, Aspen and Vail, CO.

2012 Junior Faculty Development Award, Committee on Faculty Research, Vice Chancellor and Provost, UNC, Chapel Hill, N.C.

2014 Honorary Public Health Society Delta Omega Theta Chapter Faculty Award and Membership

C) SELECTED PEER-REVIEWED PUBLICATIONS (OUT OF 33)

Most relevant to the current application:

Sun X, Casbas-Hernandez P, Bigelow C, **Makowski L**, Jerry DJ, Schneider SS, Troester MA. Normal Breast Tissue of Obese Women is Enriched For Macrophage Markers And Macrophage-Associated Gene Expression. *Breast Cancer Res Treat.* 2012 Feb;131(3):1003-12. Epub 2011 Oct PMID:22002519. PMC3640411.

Bhatt AP, Jacobs SR, Freemerman AJ, **Makowski L**, Rathmell JC, Dittmer DP, and Damania B. Dysregulation of fatty acid synthesis and glycolysis in non-Hodgkin lymphoma. *Proc Natl Acad Sci USA*. Jul 17;109(29):11818-23. Epub 2012 Jun. PMID:22752304. PMC3406848.

Brauer HA, **Makowski, L**, Hoadley KA, Lang LJ, Freemerman AJ, Perou CM, Troester MA. Impact of stromal microenvironment on metabolic phenotypes in breast cancer: evidence for stroma-influenced Warburg Effect, Clinical Cancer Research, *Clin Cancer Res.* 2012. PMID:23236214*.* PMC3684709.

Sundaram S, Freemerman AJ, McNaughton KK, Galanko JA, Bendt KM, Darr DB, Perou CM, Troester MA, **Makowski, L**. Role of HGF in obesity-associated tumorigenesis: C3(1)-Tag mice as a model for human basal-like breast cancer. *Breast Cancer Res Treat.* 2013 Dec;142(3):489-503. doi: 10.1007/s10549-013-2741-5. Epub 2013 Nov 12. PMID:24218051. PMC2904507.

Makowski L, Zhou C, Zhong Y, Kuan P-F, Fan C, Sampey BP, Difurio M, Bae-Jump VL. Obesity increases tumor aggressiveness in a genetically engineered mouse model of serous ovarian cancer. *Gynecologic Oncology- special issue The Obesity Crisis: Impact of Gynecologic Cancer.* Volume 133, Issue 1, Pages 90–97. April 2014. PMID: 3904507. PMCID in process.

Sundaram S, Le T, Essaid L, Huang MJ, Freemerman AJ, Galanko JA, McNaughton KK, Bendt KM, Darr DB, Troester MA, **Makowski, L**. Weight loss prevents obesity-associated basal-like breast cancer progression: Role of hepatocyte growth factor. *Frontiers in Oncology* 2014 Jul 8;4:175. PMID: 25072025, PMC4085881

Additional recent publications of importance to the field (in chronological order):

Makowski L*, Boord JB*, Maeda K, Babaev VR, Uysal KT, Morgan MA, Parker RA, Suttles J, Fazio S, Hotamisligil GS, Linton MF. Lack of macrophage fatty acid-binding protein aP2 protects mice deficient in apolipoprotein E against atherosclerosis. *Nature Medicine*, 7(6):699-705, 2001. PMC4027052

Maeda K, Uysal KT, **Makowski L,** Gorgun CZ, Atsumi G, Parker R, Bruning J, Vogel-Hertzel A, Bernlohr DA, Hotamisligil GS. Role of fatty acid-binding protein, mal1, in obesity and insulin resistance. *Diabetes,* Feb; 52(2):300-307, 2003 PMID12540600. PMC4027060.

Makowski L*, Brittingham K*, Reynolds JM, Suttles J, Hotamisligil GS. The fatty acid-binding protein, aP2, coordinates macrophage cholesterol trafficking and inflammatory activity. Macrophage expression of aP2 impacts peroxisome proliferator-activated receptor gamma and IkappaB kinase activities. *J Biol Chem.* Apr 1;280(13):12888-95, 2005. PMID:15684432. PMC3493120.

Furuhashi M, Tuncman G, **Makowski L**, Atsumi G, Vaillancourt E, Cao H, Görgün CZ, Kono K, Babaev VR, Fazio S, Linton MF, Sulsky R, Robl JA, Parker RA, Hotamisligil GS. Treatment of diabetes and atherosclerosis by inhibiting fatty-acid-binding protein aP2. *Nature,* 447:959-965. 2007. PMC4076119.

Makowski L, Noland RC, Koves TR, Xing W, Ilkayeva OR, Muehlbauer MJ, Stevens RD, Muoio DM. Metabolic profiling of PPARalpha-/- mice reveals defects in carnitine and amino acid homeostasis that are partially reversed by oral carnitine supplementation. FASEB J, 23(2):586-604. 2008 PMID18945875. PMC2630792.

Erbay E., Babaev VR, Mayers JR, **Makowski L**, Charles KN, Snitow ME, Fazio S, Wiest MM, Watkins SM, Linton MF, Hotamisligil GS. Reducing Endoplasmic Reticulum Stress Through a Macrophage Lipid Chaperone Alleviates Atherosclerosis. *Nature Medicine. 15(12): 1383-1391.* 2009 PMID:19966778. PMC2790330.

Sampey BP, Vanhoose AM, Winfield H, Freemerman AJ, Muehlbauer M, Fueger PT, Newgard CB, and **Makowski L**. Cafeteria-Diet is a Robust Model of Human Metabolic Syndrome with Liver and Adipose Inflammation: Comparison to High Fat Diet. *Obesity (Silver Spring).* 2011 Jun;19(6):1109-17. Epub 2011 Feb PMID:21331068. PMC3130193. (cover image in Obesity 6/2011)

Sampey BP, Freemerman AJ, Zhang J, Kuan PF, Galanko JA, O'Connell TM, Ilkayeva OR, Muehlbauer MJ, Stevens RD, Newgard CB, Brauer HA, Troester MA, **Makowski L**. Metabolomic Profiling Reveals Mitochondrial-Derived Lipid Biomarkers that Drive Obesity-Associated Inflammation. *PLoS One.* 2012;7(6):e38812. Epub 2012 Jun PMID:22701716. PMC3373493.

Freemerman AJ, Johnson AR, Sacks GN, Milner JJ, Kirk EL, Troester MA, Macintyre AN, Goraksha-Hicks P, Rathmell JC, **Makowski L**. Metabolic reprogramming of macrophages: Glucose Transporter (GLUT1)-mediated glucose metabolism drives a pro- inflammatory phenotype. *J Biol Chem*. 2014 Feb 3. [Epub ahead of print] PMID:24492615. PMC3953299.

REFEREED REVIEWS (out of 5)

Sundaram S, Johnson AR, **Makowski L**. Obesity, metabolism and the microenvironment: links to cancer. *Journal of Carcinogenesis*- Special Issue on Metabolism and Carcinogenesis. *J Carcinog.* 2013 Oct 9;12:19. eCollection 2013. PMID: 24227994, PMC3816318

Johnson AR, Milner JJ, **Makowski L**. The inflammation highway: metabolism accelerates inflammatory traffic in obesity. *Immunologic Reviews*. Volume 249, Issue 1, pages 218–238, September 2012. (P.1-21). PMID: 22889225. PMC3422768.

D) Research Support

Pending Research Support

American Institute for Cancer Research — Submitted 5/2014
Role: PI — $165,000 (total)
Examining the role of diet and weight loss in basal-like breast cancer

NIH-R01 NIDDK — Submitted 06/2013 (scored not funded)
Role: PI — $1,853,892
Metabolic reprogramming of macrophages and obesity-induced insulin resistance

Ongoing Research Support

U01 ES019472-01 — 08/2010-07/2015

NIEHS $2,200,000 (Total)**
Role: Co-I (PI- Melissa Troester) 1.8 calendar months
Pregnancy, Obesogenic Environment, and Basal-like Breast Cancer
*This project will dissect the role of parity and post-partum weight gain on the development of basal-like breast carcinoma and the role of the microenvironment in mouse models and patient samples; includes a breast cancer outreach program. **awarded two opportunity funds ($150,000 Total, I am co-PI))*

Department of Defense 1/1/2013-12/31/2015
Role: Co-I (PI- Victoria Bae-Jump) $295,333 (Total)
Pre-clinical and Clinical Investigation of the Impact of Obesity on OC Pathogenesis 0.6 calendar months
This grant will investigate how the metabolic and endocrine effects of obesity may play a contributing role in ovarian cancer (OC).

Department of Defense 6/1/2013-5/30/2015
Role: Co-I (PI- Victoria Bae-Jump) $295,333 (Total)
Obesity Exposure across the Lifespan on Ovarian Cancer Pathogenesis 2.4 calendar months
This grant will investigate unique ovarian cancer mouse model, cell culture studies, and patient samples to comprehensively interrogate characteristics unique to obesity-driven ovarian cancers.

The Mary Kay Foundation 7/1/2013-6/30/2015
Role: PI $100,000
Reversing carcinogenic effect of obesity on basal-like breast cancer 0.6 calendar months
This grant will study the role that obesity, weight loss and HGF signaling play in mouse models of basal-like breast cancer.

American Heart Association 8/1/2013-7/31/2015
Role: PI $144,000
The Role of Fuel Metabolism and Macrophage Activation in Atherosclerosis 0.6 calendar months
This grant will study the effect of metabolic reprogramming on macrophage biology and atherosclerosis.

McAllister Heart Institute, UNC Pilot Grant 9/1/2013-8/30/2017
Role: PI $20,000
The Role of Fuel Metabolism and Macrophage Activation in Atherosclerosis
This grant will study the effect of metabolic reprogramming on macrophage biology and atherosclerosis.

NIH-R21 NCI 8/1/2013-7/31/2015
Role: PI $ 352,000 (Total)
(PQA2) Reversing carcinogenic effect of obesity on basal-like breast cancer 2.4 calendar months
This project will examine reversibility of basal-like carcinogenesis through weight loss or pharmacologic means.

Completed
*K99/R00 AA017376-01 Pathway to Independence (PI) 1/1/2007 – 12/30/2012
NIH-NIAAA $907,000 (Total)
Macrophage Mitochondrial Stress in Inflammation, Insulin Resistance & Obesity
*NIH NIDDK P30DK056350- (PI) Pilot and Feasibility, UNC, $41,968 4/2010-3/2012
*NIH-NIDDK P30DK034987 - (PI) Pilot and Feasibility, UNC, $30,000 8/2010-11/2011