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	MMSc	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 School of Medicine. She is also a faculty member of the Lineberger Comprehensive Cancer Center and Nutrition Obesity Research Center, among other Centers at UNC Chapel Hill. She earned a Ph.D. in the Department of Nutrition at the Harvard School of Public Health that focused on how fatty acid binding proteins modulate the macrophage inflammatory response and cholesterol metabolism in atherosclerosis, for which she received NIH-NRSA F32 and NIH-LRP fellowships. Dr. Makowski also obtained a Masters in Medicine from Harvard Medical School concurrent with her Ph.D. studies as a Lucille P. Markey Fellow. Liza completed postdoctoral studies in the Departments of Medicine and Pharmacology & Cancer Biology using animal and cell culture models, molecular and biochemical analyses, in combination with comprehensive metabolomic profiling at the Duke University Stedman Center for Nutrition and Metabolism to address the role of mitochondrial metabolism in times of overnutrition. Her research interests are in how metabolism and inflammation of the microenvironment alters the course of local or systemic disease in states of over-nutrition and other stressors. She uses patient’s samples, animal models, cell culture, and computational approaches to address her research questions. The main focus of her lab is to understand and ultimately manipulate substrate metabolism in immune cells in order to improve the inflammatory and metabolic status of individuals and control the pathogenesis of complex diseases such as obesity, alcoholic liver disease, and cancer. Dr. Makowski has expertise in animal and cell culture-based obesity, cancer, diabetes and atherosclerosis research focusing on mitochondrial metabolism and inflammation in the macrophage and other immune cells, using biochemistry, molecular and cellular biology, microarray expression and metabolomic analysis, as well as histological analysis of breast, ovary, white and brown adipose, liver and other tissues. She has received numerous awards recognizing her efforts. Finally, Dr. Makowski currently is PI on an NIH K99/R00 to investigate macrophage mitochondria’s role in metabolism and inflammation in obesity, as well as co-investigator on an NIH U01 to study parity, obesity and breast cancer subtypes and two Department of Defense grants to examine obesity and metabolism in ovarian cancer.

B) POSITIONS, MEMBERSHIPS, AND HONORS

Positions

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, Professional Memberships

Member Nutrition Obesity Research Center, UNC
Member McAllister Heart Institute, UNC
Member Lineberger Comprehensive Cancer Center, UNC
Member The Center for Environmental Health and Susceptibility, UNC
Associate Member of the Center for Gastrointestinal Biology and Disease, UNC
Member Intravascular Biology Training, UNC
Societies: Triangle Immunology Interest Group, Society for Leukocyte Biology, Obesity Society, American Society for Nutrition, American Heart Association

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 - 2003 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.

C) SELECTED PEER-REVIEWED PUBLICATIONS (OUT OF 24)

Scheja L, **Makowski L**, Uysal KT, Wiesbrock SM, Shimshek DR, Meyers DS, Morgan M, Parker RA, Hotamisligil GS. Altered insulin secretion associated with reduced lipolytic efficiency in aP2$^{-/-}$ mice. *Diabetes*. 48(10):1987-1994, 1999. PubMed PMID: 10512363.

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. PubMed PMID: 11385507.

Boord JB, Maeda K, **Makowski L**, Babaev VR, Fazio S, Linton MF, Hotamisligil GS. Adipocyte fatty acid-binding protein, aP2, alters late atherosclerotic lesion formation in severe hypercholesterolemia. *Arteriosclerosis Thrombosis Vascular Biology*. Oct 1; 22(10):1686-91, 2002. PubMed PMID: 12377750.

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. PubMed PMID: 12540600.

Boord JB, Maeda K, **Makowski L**, Babaev VR, Fazio S, Linton MF, Hotamisligil GS. Combined adipocyte-macrophage fatty acid-binding protein deficiency improves metabolism, atherosclerosis, and survival in apoE deficient mice. *Circulation*. Sept 14;110(11):1492-8, 2004. PubMed PMID: 15353487.

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. PubMed PMID: 15684432.

Baumgartl J, Baudler S, Scherner M, Babaev V, **Makowski L**, Suttles J, McDuffie M, Fazio S, Kahn CR, Hotamisligil GS, Krone W, Linton M, Brüning JC. Myeloid lineage cell-restricted insulin resistance protects apolipoprotein E deficient mice against atherosclerosis. *Cell Metabolism*, Apr 1;3(4): 247. 2006. PubMed PMID: 16581002.

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. PubMed PMID: 17554340.

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. PMID: 18945875 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

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 17. PMID: 21331068. (cover image in Obesity 6/2011)

Sampey BP, Lewis TD, Barbier CS, **Makowski L**, Kaufman DG. Genistein Effects on Stromal Cells Determines Epithelial Proliferation in Endometrial Co-Cultures. *Exp Mol Pathol.* 2011 Jun;90(3):257-63. Epub 2011 Jan 31. PMID: 21281625

Ang MK, Patel MR, Yin X, Sundaram S, Fritchie K, Zhao N, Liu Y, Freemerman AJ, Wilkerson MD, Walter V, Weissler MC, Shockley WW, Couch ME, Zanation AM, Hackman TG, Chera BS, Harris SL, Miller CR, Thorne L, Hayward MC, Funkhouser W, Olshan AF, Shores CG, **Makowski L**, Hayes DN. High XRCC1-protein expression is associated with poorer survival in patients with head and neck squamous cell carcinoma. *Clin Cancer Res. 2011 Oct 15;17(20):6542-6552. Epub 2011 Sep 9.*PMID:21908577

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 15. PMID:22002519

Stewart DA, Yang Y, **Makowski L**, Troester MA. Basal-like breast cancer cells induce phenotypic and genomic changes in macrophages in vitro. *Molecular Cancer Research*. 2012 Apr. PMID: 22532586 2012.

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 12. PMID: 22701716

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 29. PMID: 22752304. June 2012.

Hu Y, Huang Y, Du Y, Orellana C, Singh D, Johnson A, Kuan P-F, Hammond S, **Makowski L**, Randell S, Chiang D, Hayes D, Jones, C, Liu Y, Prins J, Liu J. DiffSplice: the Genome-Wide Detection of Differential Splicing Events with RNA-seq. *Nucleic Acids Research, in press 10.2012.*

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, *Accepted 11.2012.*

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, *Submitted October 2012*.

Qin Y, Hamilton J, Bird MA, Chen MM, Ramirez L, Zahs A, Kovacs EJ, **Makowski L**. Adipose inflammation and macrophage infiltration after binge ethanol and burn injury. *Submitted October 2012*.

REFEREED REVIEWS

1. **Makowski L,** Hotamisligil GS. Fatty Acid Binding Proteins - The Evolutionary Crossroads of Inflammatory and Metabolic Responses. *Journal of Nutrition*. 134;2464S-2468S. 2004.

2. **Makowski L.** and Hotamisligil GS. The Role of Fatty Acid Binding Proteins in Metabolic Syndrome and Atherosclerosis. *Current Opinion in Lipidology.* 16(5);543*.* 2005.

3. **Makowski L.** and Hayes, DN. Role of LKB1 in Lung Cancer Development*. British Journal of Cancer.* 2008 Sep 2;99(5):683-8. 2008.

4. 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. PMID: 22889225

D) Research Support

Current

R00 AA017376-01 Pathway to Independence (Makowski Hayes) 1/1/2010 – 12/30/2012
NIH-NIAAA $747,000 (Total)
Role: PI 9 calendar months
Macrophage Mitochondrial Stress in Inflammation, Insulin Resistance & Obesity
Although strong links between obesity and inflammation exist, little is known about the role of mitochondrial metabolism in macrophage biology and whether macrophages in obese adipose tissue are in a state of mitochondrial dysregulation.

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.

U01 ES019472- Opportunity Fund 10/1/2012
NIEHS $100,000 (Total)
Role: Co-I (PI Melissa Troester) 0.6 calendar months*
Premenopausal High Fat Diet, Obesity, and Breast Cancer Microenvironment
This project will examine pubertal versus post-partum high fat diet-exposure with and without obesity, and the development of basal-like breast carcinoma and other subtypes and the role of the inflammatory microenvironment.

Department of Defense Awarded 5/9/2012 *start date pending*
Role: Co-I (PI Victoria Bae-Jump) $295,333 (Total)
0.6 calendar months*
Pre-clinical and Clinical Investigation of the Impact of Obesity on Ovarian Cancer Pathogenesis
This grant will investigate how the metabolic and endocrine effects of obesity may play a contributing role in the pathogenesis of ovarian cancer and may possibly necessitating distinct treatments for obese versus lean women.

Department of Defense Awarded 11/29/2012 *start date pending*
Role: Co-I (PI Victoria Bae-Jump) $295,333 (Total)
2.4 calendar months*
Obesity Exposure across the Lifespan on Ovarian Cancer Pathogenesis
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.

Completed

NIH NIDDK P30DK056350- (PI) Pilot and Feasibility UNC Chapel Hill, Department of Nutrition
Nutrition Obesity Research Consortium (NORC) 4/2010-3/2012
The Role of Macrophage Activation and Glucose Transport in Obesity $41,968 (Total)

NIH-NIDDK P30DK034987 – (PI) Pilot and Feasibility, UNC Chapel Hill, Department of Nutrition
Center for Gastrointestinal Biology and Disease 8/2010-11/2011
The Role of Glucose Transport and Inflammation in Kupffer Cells $30,000 (Total)

Pathway to Independence (PI) (K99/R00) K99 AA017376 2007 - 2009
NIH-NIAAA $ 160,000 (Total)
Macrophage (MP) Mitochondrial Stress in Inflammation, Insulin Resistance & Obesity

NRSA: F32 HL75970 (PI, NIH-NHLBI) 2003 – 2005
Role of Fatty Acid Binding Proteins in Lipid Signaling $96,000 (Total)