ARIC Manuscript Proposal #2716

PC Reviewed: 3/8/16	**Status: A**	**Priority: 2**
SC Reviewed: _____	**Status: _____**	**Priority: ____**

1.a. Full Title: Diet and cardiovascular disease, diabetes, the metabolic syndrome and obesity: reviewing three decades of research from the ARIC Study

b. Abbreviated Title (Length 26 characters): Review of ARIC dietary research

2. Writing Group:

Writing group members:

Margaret R. Savoca, PhD is a Research Fellow at the Wake Forest School of Medicine in the Department of Epidemiology and Prevention and has extensive experience examining dietary intake and eating behavior in relation to chronic disease and older adults.

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Lynne Wagenknecht, Dr.P.H. is Professor and Associate Director of the Division of Public Health Sciences. She is the PI of the ARIC Forsyth County Field Center.

Alain Bertoni, MD, MS is Professor and Chair of the Department of Epidemiology and Prevention and an investigator in the ARIC study.

I, the first author, confirm that all the coauthors have given their approval for this manuscript proposal. __MRS__ **[please confirm with your initials electronically or in writing]**

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3. Timeline:
Data analysis: 2 months for analysis (Savoca)
Further review of findings: 2 months
First draft of the paper: 2 months
Co-author review/revisions: 1-2 months

4. Rationale:

The ARIC Cohort Study was designed to expand our knowledge of risk factors and clinical outcomes of cardiovascular disease (CVD) experienced by Americans as they age.[1, 2] The three waves of ARIC dietary assessments spanned five years of participants' lives and beginning in 1992, provided the foundation for approximately 100 reports.[3-99] ARIC nutrition research has used a wide range of variables to assess the relationship between food and health. These have included dietary biomarkers, estimated intake of micro and macro nutrients, food components and groups, composite food scores, meal patterns, and food environment characteristics. CVD and related conditions, such as diabetes, and metabolic syndrome (MetS), have been associated with diet using prevalence, mortality and hospitalization data, behavioral assessments, clinical measures of disease and metabolism, cellular studies, and genomics. Now in its third decade, ARIC's dietary research parallels the time period when nutrition science was expanding its focus beyond medical nutrition therapy to include nutritional epidemiology with an emphasis on the role of diet in health and the development of chronic disease.[100]

Since the 1980's when ARIC began, the relationships among diabetes, MetS and CVD were established.[101] In this same period, US obesity rates rose from 23% in the late 80's to 36% in 2011-2015.[102] This paralleled dramatic increases in the number of Americans with diagnosed diabetes. Between 1980 and 2014, the number of US adults with diabetes increased from 5.5 million to 22.0 million.[103] By 2011, 63% of the adult incident cases of diabetes were diagnosed between the ages of 40 and 64 years; similar to the age range of ARIC participants when they were enrolled.[104] Overall rate of MetS declined from 26% in 1999-2000 to 23% in 2009-2010 due to improvements in blood pressure, triglycerides and HDL; however, rates of hyperglycemia and elevated waist circumference increased.[105] Heart disease mortality declined in this period, yet it is still the number one cause of US deaths accounting for one of three deaths.[106] ARIC dietary research offers important insights on the sub-optimal dietary patterns linked to these chronic conditions. When viewed as a whole, ARIC nutrition research can provide guidance for public health and clinical research initiatives to reduce the risk of and manage chronic diseases. This review provides an opportunity to review the ARIC dietary measures; highlight key findings about the association between diet and diabetes, CVD, MetS, and obesity; and consider future directions for ARIC nutrition research.

5. Main Hypothesis/Study Questions:

1. Describe the methods used for ARIC dietary investigations.
2. Trace the changes in approaches and methods in dietary investigation in ARIC over three decades.
3. Discuss future directions for ARIC dietary research.

6. Design and analysis (study design, inclusion/exclusion, outcome and other variables of interest with specific reference to the time of their collection, summary of data analysis, and any anticipated methodologic limitations or challenges if present).

The analysis for this review will use a qualitative approach which will include:

1. (Lead Author) Identify ARIC reports that include dietary variables as a predictor (independent variables) and clinical outcomes and risk factors for CVD, diabetes, or MetS (dependent variables). Reports where diet is used as a covariate will not be included. The primary resources will be the ARIC Publication database and PubMed.
2. (Lead Author) Create an Access database which will permit the storage, sorting, and retrieval of the report (case) summary grid for the analysis. Capture the sample characteristics and exclusions, the dietary measure(s), outcome measures, statistical method, results, and comments for each case.
3. (Lead Author) Organize dietary measures and outcomes into broad categories. Cases will be labeled by these categories.
4. (Lead Author) Prepare category summaries for dietary measures and outcomes separately.
5. (Writing Group) Review category summaries and identify key findings.
6. (Writing Group) Come to a consensus on the key findings and areas where further research is needed.

7.a. Will the data be used for non-CVD analysis in this manuscript? ____ Yes __X__ No

b. If Yes, is the author aware that the file ICTDER03 must be used to exclude persons with a value RES_OTH = "CVD Research" for non-DNA analysis, and for DNA analysis RES_DNA = "CVD Research" would be used? ____ Yes ____ No
(This file ICTDER has been distributed to ARIC PIs, and contains the responses to consent updates related to stored sample use for research.)

8.a. Will the DNA data be used in this manuscript? ____ Yes __X__ No

8.b. If yes, is the author aware that either DNA data distributed by the Coordinating Center must be used, or the file ICTDER03 must be used to exclude those with value RES_DNA = "No use/storage DNA"? ____ Yes ____ No

9. The lead author of this manuscript proposal has reviewed the list of existing ARIC Study manuscript proposals and has found no overlap between this proposal and previously approved manuscript proposals either published or still in active status.
ARIC Investigators have access to the publications lists under the Study Members Area of the web site at: http://www.cscc.unc.edu/ARIC/search.php

____X____ Yes _____ No

10. What are the most related manuscript proposals in ARIC (authors are encouraged to contact lead authors of these proposals for comments on the new proposal or collaboration)? See attached Citation List

11.a. Is this manuscript proposal associated with any ARIC ancillary studies or use any ancillary study data? ____ Yes __X__ No

11.b. If yes, is the proposal

___ A. primarily the result of an ancillary study (list number* _____)

___ B. primarily based on ARIC data with ancillary data playing a minor role (usually control variables; list number(s)* _____ _____ _____)

*ancillary studies are listed by number at http://www.cscc.unc.edu/aric/forms/

12a. Manuscript preparation is expected to be completed in one to three years. If a manuscript is not submitted for ARIC review at the end of the 3-years from the date of the approval, the manuscript proposal will expire.

12b. The NIH instituted a Public Access Policy in April, 2008 which ensures that the public has access to the published results of NIH funded research. It is **your responsibility to upload manuscripts to PUBMED Central** whenever the journal does not and be in compliance with this policy. Four files about the public access policy from http://publicaccess.nih.gov/ are posted in http://www.cscc.unc.edu/aric/index.php, under Publications, Policies & Forms. http://publicaccess.nih.gov/submit_process_journals.htm shows you which journals automatically upload articles to PubMed central.

13. Per Data Use Agreement Addendum for the Use of Linked ARIC CMS Data, approved manuscripts using linked ARIC CMS data shall be submitted by the Coordinating Center to CMS for informational purposes prior to publication. Approved manuscripts should be sent to Pingping Wu at CC, at pingping_wu@unc.edu. I will be using CMS data in my manuscript ____ Yes __X__ No.

References

1. The Atherosclerosis Risk in Communities (ARIC) Study: design and objectives. The ARIC investigators. American Journal of Epidemiology. 1989;129(4):687-702.
2. Wu KK, Papp AC, Patsch W, Rock R, Eckfeldt J, Sharrett R**.** ARIC hemostasis study--II. Organizational plan and feasibility study. Thromb Haemost. 1990;64(4):521-5.
3. Alonso A, Steffen LM, Folsom AR**.** Dairy intake and changes in blood pressure over 9 years: the ARIC study. Eur J Clin Nutr. 2009;63(10):1272-5.
4. Alonso A, Nettleton JA, Ix JH, de Boer IH, Folsom AR, Bidulescu A, et al. Dietary phosphorus, blood pressure, and incidence of hypertension in the atherosclerosis risk in communities study and the multi-ethnic study of atherosclerosis. Hypertension. 2010;55(3):776-84.
5. Beydoun MA, Kaufman JS, Sloane PD, Heiss G, Ibrahim J**.** n-3 Fatty acids, hypertension and risk of cognitive decline among older adults in the Atherosclerosis Risk in Communities (ARIC) study. Public Health Nutr. 2008;11(1):17-29.
6. Bidulescu A, Chambless LE, Siega-Riz AM, Zeisel SH, Heiss G**.** Usual choline and betaine dietary intake and incident coronary heart disease: the Atherosclerosis Risk in Communities (ARIC) study. BMC cardiovascular disorders. 2007;7:20.
7. Bidulescu A, Chambless LE, Siega-Riz AM, Zeisel SH, Heiss G**.** Repeatability and measurement error in the assessment of choline and betaine dietary intake: the Atherosclerosis Risk in Communities (ARIC) study. Nutrition journal. 2009;8:14.
8. Bomback AS, Derebail VK, Shoham DA, Anderson CA, Steffen LM, Rosamond WD, et al. Sugar-sweetened soda consumption, hyperuricemia, and kidney disease. Kidney Int. 2010;77(7):609-16.
9. Brown SA, Chambless LE, Sharrett AR, Gotto AM, Jr., Patsch W**.** Postprandial lipemia: reliability in an epidemiologic field study. American Journal of Epidemiology. 1992;136(5):538-45.
10. Chatterjee R, Yeh HC, Shafi T, Selvin E, Anderson C, Pankow JS, et al. Serum and dietary potassium and risk of incident type 2 diabetes mellitus: The Atherosclerosis Risk in Communities (ARIC) study. Arch Internal Med. 2010;170(19):1745-51.
11. Chatterjee R, Yeh HC, Shafi T, Anderson C, Pankow JS, Miller ER, et al. Serum potassium and the racial disparity in diabetes risk: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 2011;93(5):1087-91.
12. Demirovic J, Nabulsi A, Folsom AR, Carpenter MA, Szklo M, Sorlie PD, et al. Alcohol consumption and ultrasonographically assessed carotid artery wall thickness and distensibility. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Circulation. 1993;88(6):2787-93.
13. Diez-Roux AV, Nieto FJ, Caulfield L, Tyroler HA, Watson RL, Szklo M**.** Neighbourhood differences in diet: the Atherosclerosis Risk in Communities (ARIC) Study. J Epidemiol Community Health. 1999;53(1):55-63.

14. Folsom AR, Ma J, Eckfeldt JH, Shahar E, Wu KK**.** Plasma phospholipid fatty acid composition and factor VII coagulant activity. Atherosclerosis. 1994;111(2):199-207.
15. Folsom AR, Ma J, McGovern PG, Eckfeldt H**.** Relation between plasma phospholipid saturated fatty acids and hyperinsulinemia. Metabolism. 1996;45(2):223-8.
16. Folsom AR, Nieto FJ, McGovern PG, Tsai MY, Malinow MR, Eckfeldt JH, et al. Prospective study of coronary heart disease incidence in relation to fasting total homocysteine, related genetic polymorphisms, and B vitamins: the Atherosclerosis Risk in Communities (ARIC) study. Circulation. 1998;98(3):204-10.
17. Folsom AR, Vitelli LL, Lewis CE, Schreiner PJ, Watson RL, Wagenknecht LE**.** Is fasting insulin concentration inversely associated with rate of weight gain? Contrasting findings from the CARDIA and ARIC study cohorts. Int J Obes Relat Metab Disord. 1998;22(1):48-54.
18. Folsom AR, Desvarieux M, Nieto FJ, Boland LL, Ballantyne CM, Chambless LE**.** B vitamin status and inflammatory markers. Atherosclerosis. 2003;169(1):169-74.
19. Folsom AR, Chambless LE, Duncan BB, Gilbert AC, Pankow JS, Atherosclerosis Risk in Communities Study I**.** Prediction of coronary heart disease in middle-aged adults with diabetes. Diabetes Care. 2003;26(10):2777-84.
20. Folsom AR, Yatsuya H, Nettleton JA, Lutsey PL, Cushman M, Rosamond WD, et al. Community prevalence of ideal cardiovascular health, by the American Heart Association definition, and relationship with cardiovascular disease incidence. J Am Coll Cardiol. 2011;57(16):1690-6.
21. Folsom AR, Shah AM, Lutsey PL, Roetker NS, Alonso A, Avery CL, et al. American Heart Association's Life's Simple 7: Avoiding Heart Failure and Preserving Cardiac Structure and Function. Am J Med. 2015;128(9):970-6 e2.
22. Folsom AR, Olson NC, Lutsey PL, Roetker NS, Cushman M**.** American Heart Association's Life's Simple 7 and incidence of venous thromboembolism. Am J Hematol. 2015;90(5):E92.
23. Fuchs FD, Chambless LE, Whelton PK, Nieto FJ, Heiss G**.** Alcohol consumption and the incidence of hypertension: The Atherosclerosis Risk in Communities Study. Hypertension. 2001;37(5):1242-50.
24. Fuchs FD, Chambless LE, Folsom AR, Eigenbrodt ML, Duncan BB, Gilbert A, et al. Association between alcoholic beverage consumption and incidence of coronary heart disease in whites and blacks: the Atherosclerosis Risk in Communities Study. American Journal of Epidemiology. 2004;160(5):466-74.
25. Gronroos NN, Chamberlain AM, Folsom AR, Soliman EZ, Agarwal SK, Nettleton JA, et al. Fish, fish-derived n-3 fatty acids, and risk of incident atrial fibrillation in the Atherosclerosis Risk in Communities (ARIC) study. PloS one. 2012;7(5):e36686.
26. Hardy DS, Hoelscher DM, Aragaki C, Stevens J, Steffen LM, Pankow JS, et al. Association of glycemic index and glycemic load with risk of incident coronary heart disease among Whites and African Americans with and without type 2 diabetes: the Atherosclerosis Risk in Communities study. Ann Epidemiol. 2010;20(8):610-6.

27. Hardy DS, Racette SB, Hoelscher DM**.** Macronutrient intake as a mediator with FTO to increase body mass index. J Am Coll Nutr. 2014;33(4):256-66.
28. Haring B, Gronroos N, Nettleton JA, von Ballmoos MC, Selvin E, Alonso A**.** Dietary protein intake and coronary heart disease in a large community based cohort: results from the Atherosclerosis Risk in Communities (ARIC) study [corrected]. PloS one. 2014;9(10):e109552.
29. Houston DK, Stevens J, Cai J, Haines PS**.** Dairy, fruit, and vegetable intakes and functional limitations and disability in a biracial cohort: the Atherosclerosis Risk in Communities Study. Am J Clin Nutr. 2005;81(2):515-22.
30. Hruby A, Ngwa JS, Renstrom F, Wojczynski MK, Ganna A, Hallmans G, et al. Higher magnesium intake is associated with lower fasting glucose and insulin, with no evidence of interaction with select genetic loci, in a meta-analysis of 15 CHARGE Consortium Studies. J Nutr. 2013;143(3):345-53.
31. Imamura F, Lemaitre RN, King IB, Song X, Steffen LM, Folsom AR, et al. Long-chain monounsaturated Fatty acids and incidence of congestive heart failure in 2 prospective cohorts. Circulation. 2013;127(14):1512-21, 21e1-18.
32. Iribarren C, Folsom AR, Jacobs DR, Jr., Gross MD, Belcher JD, Eckfeldt JH**.** Association of serum vitamin levels, LDL susceptibility to oxidation, and autoantibodies against MDA-LDL with carotid atherosclerosis. A case-control study. The ARIC Study Investigators. Atherosclerosis Risk in Communities. Arterioscler Thromb Vasc Biol. 1997;17(6):1171-7.
33. Iribarren C, Sempos CT, Eckfeldt JH, Folsom AR**.** Lack of association between ferritin level and measures of LDL oxidation: the ARIC study. Atherosclerosis Risk in Communities. Atherosclerosis. 1998;139(1):189-95.
34. Jehn ML, Guallar E, Clark JM, Couper D, Duncan BB, Ballantyne CM, et al. A prospective study of plasma ferritin level and incident diabetes: the Atherosclerosis Risk in Communities (ARIC) Study. American Journal of Epidemiology. 2007;165(9):1047-54.
35. Juhaeri, Steven J, Chambless LE, Tyroler HA, Harp J, Jones D, et al. Weight change among self-reported dieters and non-dieters in white and African American men and women. Eur J Epidemiol. 2001;17(10):917-23.
36. Kan H, Stevens J, Heiss G, Klein R, Rose KM, London SJ**.** Dietary fiber intake and retinal vascular caliber in the Atherosclerosis Risk in Communities Study. Am J Clin Nutr. 2007;86(6):1626-32.
37. Kanoni S, Nettleton JA, Hivert MF, Ye Z, van Rooij FJ, Shungin D, et al. Total zinc intake may modify the glucose-raising effect of a zinc transporter (SLC30A8) variant: a 14-cohort meta-analysis. Diabetes. 2011;60(9):2407-16.
38. Kao WH, Folsom AR, Nieto FJ, Mo JP, Watson RL, Brancati FL**.** Serum and dietary magnesium and the risk for type 2 diabetes mellitus: the Atherosclerosis Risk in Communities Study. Arch Internal Med. 1999;159(18):2151-9.

39. Kingah PL, Luu HN, Volcik KA, Morrison AC, Nettleton JA, Boerwinkle E**.** Association of NOS3 Glu298Asp SNP with hypertension and possible effect modification of dietary fat intake in the ARIC study. Hypertens Res. 2010;33(2):165-9.
40. Kritchevsky SB, Shimakawa T, Tell GS, Dennis B, Carpenter M, Eckfeldt JH, et al. Dietary antioxidants and carotid artery wall thickness. The ARIC Study. Atherosclerosis Risk in Communities Study. Circulation. 1995;92(8):2142-50.
41. Kritchevsky SB, Tell GS, Shimakawa T, Dennis B, Li R, Kohlmeier L, et al. Provitamin A carotenoid intake and carotid artery plaques: the Atherosclerosis Risk in Communities Study. Am J Clin Nutr. 1998;68(3):726-33.
42. Liao F, Folsom AR, Brancati FL. Is low magnesium concentration a risk factor for coronary heart disease? The Atherosclerosis Risk in Communities (ARIC) Study. Am Heart J. 1998;136(3):480-90.
43. Lutsey PL, Steffen LM, Stevens J**.** Dietary intake and the development of the metabolic syndrome: the Atherosclerosis Risk in Communities study. Circulation. 2008;117(6):754-61.
44. Lutsey PL, Alonso A, Michos ED, Loehr LR, Astor BC, Coresh J, et al. Serum magnesium, phosphorus, and calcium are associated with risk of incident heart failure: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 2014;100(3):756-64.
45. Lutsey PL, Michos ED, Misialek JR, Pankow JS, Loehr L, Selvin E, et al. Race and Vitamin D Binding Protein Gene Polymorphisms Modify the Association of 25-Hydroxyvitamin D and Incident Heart Failure: The ARIC (Atherosclerosis Risk in Communities) Study. JACC Heart failure. 2015;3(5):347-56.
46. Lutsey PL, Eckfeldt JH, Ogagarue ER, Folsom AR, Michos ED, Gross M**.** The 25-hydroxyvitamin D3 C-3 epimer: distribution, correlates, and reclassification of 25-hydroxyvitamin D status in the population-based Atherosclerosis Risk in Communities Study (ARIC). Clin Chim Acta. 2015;442:75-81.
47. Ma J, Folsom AR, Eckfeldt JH, Lewis L, Chambless LE**.** Short- and long-term repeatability of fatty acid composition of human plasma phospholipids and cholesterol esters. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Am J Clin Nutr. 1995;62(3):572-8.
48. Ma J, Folsom AR, Melnick SL, Eckfeldt JH, Sharrett AR, Nabulsi AA, et al. Associations of serum and dietary magnesium with cardiovascular disease, hypertension, diabetes, insulin, and carotid arterial wall thickness: the ARIC study. Atherosclerosis Risk in Communities Study. J Clin Epidemiol. 1995;48(7):927-40.
49. Ma J, Folsom AR, Shahar E, Eckfeldt JH**.** Plasma fatty acid composition as an indicator of habitual dietary fat intake in middle-aged adults. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Am J Clin Nutr. 1995;62(3):564-71.
50. Ma J, Folsom AR, Lewis L, Eckfeldt JH**.** Relation of plasma phospholipid and cholesterol ester fatty acid composition to carotid artery intima-media thickness: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 1997;65(2):551-9.

51. Ma Y, Tucker KL, Smith CE, Lee YC, Huang T, Richardson K, et al. Lipoprotein lipase variants interact with polyunsaturated fatty acids for obesity traits in women: replication in two populations. Nutr Metab Cardiovasc Dis. 2014;24(12):1323-9.
52. Metcalf PA, Sharrett AR, Folsom AR, Duncan BB, Patsch W, Hutchinson RG, et al. African American-white differences in lipids, lipoproteins, and apolipoproteins, by educational attainment, among middle-aged adults: the Atherosclerosis Risk in Communities Study. American Journal of Epidemiology. 1998;148(8):750-60.
53. Matsushita K, Williams EK, Mongraw-Chaffin ML, Coresh J, Schmidt MI, Brancati FL, et al. The association of plasma lactate with incident cardiovascular outcomes: the ARIC Study. American Journal of Epidemiology. 2013;178(3):401-9.
54. McAdams-DeMarco MA, Maynard JW, Coresh J, Baer AN**.** Anemia and the onset of gout in a population-based cohort of adults: Atherosclerosis Risk in Communities study. Arthritis research & therapy. 2012;14(4):R193.
55. Maynard JW, McAdams DeMarco MA, Baer AN, Kottgen A, Folsom AR, Coresh J, et al. Incident gout in women and association with obesity in the Atherosclerosis Risk in Communities (ARIC) Study. Am J Med. 2012;125(7):717 e9- e17.
56. Meyer AM, Evenson KR, Couper DJ, Stevens J, Pereria MA, Heiss G**.** Television, physical activity, diet, and body weight status: the ARIC cohort. Int J Behav Nutr Phys Act. 2008;5:68.
57. Millen AE, Klein R, Folsom AR, Stevens J, Palta M, Mares JA**.** Relation between intake of vitamins C and E and risk of diabetic retinopathy in the Atherosclerosis Risk in Communities Study. Am J Clin Nutr. 2004;79(5):865-73.
58. Misialek JR, Lopez FL, Lutsey PL, Huxley RR, Peacock JM, Chen LY, et al. Serum and dietary magnesium and incidence of atrial fibrillation in whites and in African Americans--Atherosclerosis Risk in Communities (ARIC) study. Circulation journal : official journal of the Japanese Circulation Society. 2013;77(2):323-9.
59. Moore M, Folsom AR, Barnes RW, Eckfeldt JH**.** No association between serum ferritin and asymptomatic carotid atherosclerosis. The Atherosclerosis Risk in Communities (ARIC) Study. American Journal of Epidemiology. 1995;141(8):719-23.
60. Morland K, Wing S, Diez Roux A**.** The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. Am J Public Health. 2002;92(11):1761-7.
61. Morland K, Wing S, Diez Roux A, Poole C**.** Neighborhood characteristics associated with the location of food stores and food service places. Am J Prev Med. 2002;22(1):23-9.
62. Morland K, Diez Roux AV, Wing S**.** Supermarkets, other food stores, and obesity: the atherosclerosis risk in communities study. Am J Prev Med. 2006;30(4):333-9.
63. Nettleton JA, Steffen LM, Ballantyne CM, Boerwinkle E, Folsom AR**.** Associations between HDL-cholesterol and polymorphisms in hepatic lipase and lipoprotein lipase genes are modified by dietary fat intake in African American and White adults. Atherosclerosis. 2007;194(2):e131-40.

64. Nettleton JA, Steffen LM, Loehr LR, Rosamond WD, Folsom AR**.** Incident heart failure is associated with lower whole-grain intake and greater high-fat dairy and egg intake in the Atherosclerosis Risk in Communities (ARIC) study. J Am Diet Assoc. 2008;108(11):1881-7.
65. Nettleton JA, Volcik KA, Hoogeveen RC, Boerwinkle E**.** Carbohydrate intake modifies associations between ANGPTL4[E40K] genotype and HDL-cholesterol concentrations in White men from the Atherosclerosis Risk in Communities (ARIC) study. Atherosclerosis. 2009;203(1):214-20.
66. Nettleton JA, Follis JL, Schabath MB**.** Coffee intake, smoking, and pulmonary function in the Atherosclerosis Risk in Communities Study. American Journal of Epidemiology. 2009;169(12):1445-53.
67. Nettleton JA, Matijevic N, Follis JL, Folsom AR, Boerwinkle E**.** Associations between dietary patterns and flow cytometry-measured biomarkers of inflammation and cellular activation in the Atherosclerosis Risk in Communities (ARIC) Carotid Artery MRI Study. Atherosclerosis. 2010;212(1):260-7.
68. Nettleton JA, McKeown NM, Kanoni S, Lemaitre RN, Hivert MF, Ngwa J, et al. Interactions of dietary whole-grain intake with fasting glucose- and insulin-related genetic loci in individuals of European descent: a meta-analysis of 14 cohort studies. Diabetes Care. 2010;33(12):2684-91.
69. Pankow JS, Boerwinkle E, Adams PC, Guallar E, Leiendecker-Foster C, Rogowski J, et al. HFE C282Y homozygotes have reduced low-density lipoprotein cholesterol: the Atherosclerosis Risk in Communities (ARIC) Study. Translational research : the journal of laboratory and clinical medicine. 2008;152(1):3-10.
70. Paynter NP, Yeh HC, Voutilainen S, Schmidt MI, Heiss G, Folsom AR, et al. Coffee and sweetened beverage consumption and the risk of type 2 diabetes mellitus: the atherosclerosis risk in communities study. American Journal of Epidemiology. 2006;164(11):1075-84.
71. Peacock JM, Folsom AR, Arnett DK, Eckfeldt JH, Szklo M**.** Relationship of serum and dietary magnesium to incident hypertension: the Atherosclerosis Risk in Communities (ARIC) Study. Ann Epidemiol. 1999;9(3):159-65.
72. Peacock JM, Folsom AR, Knopman DS, Mosley TH, Goff DC, Jr., Szklo M**.** Dietary antioxidant intake and cognitive performance in middle-aged adults. The Atherosclerosis Risk in Communities (ARIC) Study investigators. Public Health Nutr. 2000;3(3):337-43.
73. Peacock JM, Ohira T, Post W, Sotoodehnia N, Rosamond W, Folsom AR**.** Serum magnesium and risk of sudden cardiac death in the Atherosclerosis Risk in Communities (ARIC) Study. Am Heart J. 2010;160(3):464-70.
74. Rasmussen-Torvik LJ, Shay CM, Abramson JG, Friedrich CA, Nettleton JA, Prizment AE, et al. Ideal cardiovascular health is inversely associated with incident cancer: the Atherosclerosis Risk In Communities study. Circulation. 2013;127(12):1270-5.
75. Raynor LA, Pankow JS, Duncan BB, Schmidt MI, Hoogeveen RC, Pereira MA, et al. Novel risk factors and the prediction of type 2 diabetes in the Atherosclerosis Risk in Communities (ARIC) study. Diabetes Care. 2013;36(1):70-6.

76. Rebholz CM, Coresh J, Grams ME, Steffen LM, Anderson CA, Appel LJ, et al. Dietary Acid Load and Incident Chronic Kidney Disease: Results from the ARIC Study. Am J Nephrol. 2015;42(6):427-35.
77. Rebholz CM, Grams ME, Lutsey PL, Hoofnagle AN, Misialek JR, Inker LA, et al. Biomarkers of Vitamin D Status and Risk of ESRD. Am J Kidney Dis. 2016;67(2):235-42.
78. Reis JP, Michos ED, Selvin E, Pankow JS, Lutsey PL**.** Race, vitamin D-binding protein gene polymorphisms, 25-hydroxyvitamin D, and incident diabetes: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 2015;101(6):1232-40.
79. Schneider AL, Lutsey PL, Selvin E, Mosley TH, Sharrett AR, Carson KA, et al. Vitamin D, vitamin D binding protein gene polymorphisms, race and risk of incident stroke: the Atherosclerosis Risk in Communities (ARIC) study. Eur J Neurol. 2015;22(8):1220-7.
80. Shahar E, Folsom AR, Wu KK, Dennis BH, Shimakawa T, Conlan MG, et al. Associations of fish intake and dietary n-3 polyunsaturated fatty acids with a hypocoagulable profile. The Atherosclerosis Risk in Communities (ARIC) Study. Arterioscler Thromb. 1993;13(8):1205-12.
81. Shahar E, Folsom AR, Melnick SL, Tockman MS, Comstock GW, Shimakawa T, et al. Does dietary vitamin A protect against airway obstruction? The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Am J Respir Crit Care Med. 1994;150(4):978-82.
82. Shahar E, Folsom AR, Melnick SL, Tockman MS, Comstock GW, Gennaro V, et al. Dietary n-3 polyunsaturated fatty acids and smoking-related chronic obstructive pulmonary disease. Atherosclerosis Risk in Communities Study Investigators. N Engl J Med. 1994;331(4):228-33.
83. Shahar E, Folsom A**.** Fish consumption may limit the damage of smoking on the lung. Am J Respir Crit Care Med. 1995;151(5):1688-9.
84. Sharrett AR, Chambless LE, Heiss G, Paton CC, Patsch W**.** Association of postprandial triglyceride and retinyl palmitate responses with asymptomatic carotid artery atherosclerosis in middle-aged men and women. The Atherosclerosis Risk in Communities (ARIC) Study. Arterioscler Thromb Vasc Biol. 1995;15(12):2122-9.
85. Sharrett AR, Heiss G, Chambless LE, Boerwinkle E, Coady SA, Folsom AR, et al. Metabolic and lifestyle determinants of postprandial lipemia differ from those of fasting triglycerides: The Atherosclerosis Risk In Communities (ARIC) study. Arterioscler Thromb Vasc Biol. 2001;21(2):275-81.
86. Shimakawa T, Sorlie P, Carpenter MA, Dennis B, Tell GS, Watson R, et al. Dietary intake patterns and sociodemographic factors in the atherosclerosis risk in communities study. ARIC Study Investigators. Prev Med. 1994;23(6):769-80.
87. Shimakawa T, Nieto FJ, Malinow MR, Chambless LE, Schreiner PJ, Szklo M**.** Vitamin intake: a possible determinant of plasma homocyst(e)ine among middle-aged adults. Ann Epidemiol. 1997;7(4):285-93.
88. Steffen LM, Jacobs DR, Jr., Stevens J, Shahar E, Carithers T, Folsom AR**.** Associations of whole-grain, refined-grain, and fruit and vegetable consumption with risks of all-cause

mortality and incident coronary artery disease and ischemic stroke: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 2003;78(3):383-90.
89. Steffen LM, Folsom AR, Cushman M, Jacobs DR, Jr., Rosamond WD**.** Greater fish, fruit, and vegetable intakes are related to lower incidence of venous thromboembolism: the Longitudinal Investigation of Thromboembolism Etiology. Circulation. 2007;115(2):188-95.
90. Stevens J, Ahn K, Juhaeri, Houston D, Steffan L, Couper D**.** Dietary fiber intake and glycemic index and incidence of diabetes in African-American and white adults: the ARIC study. Diabetes Care. 2002;25(10):1715-21.
91. Tell GS, Evans GW, Folsom AR, Shimakawa T, Carpenter MA, Heiss G**.** Dietary fat intake and carotid artery wall thickness: the Atherosclerosis Risk in Communities (ARIC) Study. American Journal of Epidemiology. 1994;139(10):979-89.
92. Volcik KA, Nettleton JA, Ballantyne CM, Boerwinkle E**.** Peroxisome proliferator-activated receptor [alpha] genetic variation interacts with n-6 and long-chain n-3 fatty acid intake to affect total cholesterol and LDL-cholesterol concentrations in the Atherosclerosis Risk in Communities Study. Am J Clin Nutr. 2008;87(6):1926-31.
93. Wang L, Folsom AR, Eckfeldt JH**.** Plasma fatty acid composition and incidence of coronary heart disease in middle aged adults: the Atherosclerosis Risk in Communities (ARIC) Study. Nutr Metab Cardiovasc Dis. 2003;13(5):256-66.
94. Wang L, Folsom AR, Zheng ZJ, Pankow JS, Eckfeldt JH, Investigators AS**.** Plasma fatty acid composition and incidence of diabetes in middle-aged adults: the Atherosclerosis Risk in Communities (ARIC) Study. Am J Clin Nutr. 2003;78(1):91-8.
95. Weng LC, Steffen LM, Szklo M, Nettleton J, Chambless L, Folsom AR**.** A diet pattern with more dairy and nuts, but less meat is related to lower risk of developing hypertension in middle-aged adults: the Atherosclerosis Risk in Communities (ARIC) study. Nutrients. 2013;5(5):1719-33.
96. Yamagishi K, Folsom AR, Steffen LM, Investigators AS**.** Plasma fatty acid composition and incident ischemic stroke in middle-aged adults: the Atherosclerosis Risk in Communities (ARIC) Study. Cerebrovasc Dis. 2013;36(1):38-46.
97. Yeung EH, Saudek CD, Jahren AH, Kao WH, Islas M, Kraft R, et al. Evaluation of a novel isotope biomarker for dietary consumption of sweets. American Journal of Epidemiology. 2010;172(9):1045-52.
98. Yu B, Zheng Y, Alexander D, Manolio TA, Alonso A, Nettleton JA, et al. Genome-wide association study of a heart failure related metabolomic profile among African Americans in the Atherosclerosis Risk in Communities (ARIC) study. Genet Epidemiol. 2013;37(8):840-5.
99. Zhang Y, Post WS, Dalal D, Bansal S, Blasco-Colmenares E, Jan De Beur S, et al. Serum 25-hydroxyvitamin D, calcium, phosphorus, and electrocardiographic QT interval duration: findings from NHANES III and ARIC. J Clin Endocrinol Metab. 2011;96(6):1873-82.
100. Zheng Y, Yu B, Alexander D, Manolio TA, Aguilar D, Coresh J, et al. Associations between metabolomic compounds and incident heart failure among African Americans: the ARIC Study. American Journal of Epidemiology. 2013;178(4):534-42.

101. Simopoulos AP. Diet and health: scientific concepts and principles conference commentary. J Nutr. 1987;117(8):1353-9.
102. Alexander CM, Landsman PB, Teutsch SM, Haffner SM, Third National H, Nutrition Examination S, et al. NCEP-defined metabolic syndrome, diabetes, and prevalence of coronary heart disease among NHANES III participants age 50 years and older. Diabetes. 2003;52(5):1210-4.
103. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. Jama. 2014;311(8):806-14.
104. Galassi A, Reynolds K, He J. Metabolic syndrome and risk of cardiovascular disease: a meta-analysis. Am J Med. 2006;119(10):812-9.
105. Center for Disease Control and Prevention. Distribution of age at diagnosis of diabetes among adult incident cases aged 18-79 years, United States 2011. Atlanta, GA: Center for Disease Control and Prevention; 2015.http://www.cdc.gov/diabetes/statistics/age/fig1.htm
106. Beltran-Sanchez H, Harhay MO, Harhay MM, McElligott S. Prevalence and trends of metabolic syndrome in the adult U.S. population, 1999-2010. J Am Coll Cardiol. 2013;62(8):697-703.
107. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Heart Disease and Stroke Statistics-2016 Update: A Report From the American Heart Association. Circulation. 2016;133(4):e38-e360.