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Impact of Processed Food on Heart Health

Elizabeth Moxley
Northern Illinois University, emoxley@niu.edu

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Cardiovascular disease (CVD), particularly atherosclerotic cardiovascular disease (ASCVD), remains the leading cause of death on a global scale.[i],[ii] CVD is also the leading cause of death in patients with type 2 diabetes (T2D), specifically in low- and middle-income countries.[iii] In spite of the improvement in ASCVD outcomes in recent decades, pervasive levels of ASCVD morbidity and mortality continue to be unfavorable.[iv] According to the American Heart Association,[5] effectively promoting dietary improvements and engagement in regular physical activity help prevent the ongoing risk of ASCVD. This article delves into the relationship between diet and ASCVD, shedding light on the detrimental effects of poor dietary options, particularly the consumption of processed foods.

Poor Diet: A Culprit for Obesity-Related ASCVD

It is well-established that ASCVD results from a poor diet, and is associated with comorbidities of obesity, type 2 diabetes (T2D), and hypertension.[v],[vi],[vii],[viii] Approximately 73% of Americans are currently overweight or obese. A consistent upward trend in weight has occurred in recent decades amongst adults and children.[ix],[x] The obesity epidemic is a leading cause of worldwide death and disability.[xi] Ironically, it is a more significant health concern than global hunger.[xii]

Recent research suggests the obesity epidemic is either due to an increased energy intake (e.g., food), decreased energy expenditure (e.g., physical inactivity), or both.[xiii] The increased popularity of fast-food restaurants and the current food industry are contributing factors. According to Kaufman,[xiv] "it's cheaper to eat fries than fruit,"—and fast-food burgers are now three times the size they were in the 1950s.[xv] Along with an excess consumption of sugar-sweetened beverages, low-priced ultra-processed foods (UPFs) foster excess consumption of unhealthy diets.[xv]

Food Formulation and Food Processing

Foods in their whole or natural state are preferred for a healthy diet[xvi]—but a wide variety of processing methods has led to the availability of a vast array of consumer goods. Not all of these processing methods, however, are healthy, and may even be harmful.

Processing changes food from its natural state—a raw commodity that undergoes washing, cleaning, milling, cutting, chopping, heating, pasteurizing, blanching, cooking, canning, freezing, drying, dehydrating, mixing, packaging, or other procedures.[xvii]

Food can also be processed with the addition of less healthy options such as added sugars and caloric sweeteners, refined flours, saturated fats, and salt.[xvi] Preservatives, flavors, and nutrients may also be added.

The NOVA classification[xviii] includes four categories that describe the amount of processing that is completed before a food product reaches consumers.

1. **Unprocessed or Minimally Processed Foods** include the natural edible food parts of plants and animals. Minimally processed foods have been altered only slightly so they can be more easily stored, prepared, or eaten—and these changes do not substantially change the food's nutritional content.
    - Examples include fresh fruits, vegetables, whole grains, nuts, meats, plain yogurt with no added sugar or artificial sweeteners, fresh and dried pasta, tea, coffee, and milk.
2. **Processed culinary ingredients** include minimally-processed foods and seasonings that are not typically eaten on their own, but may be pressed, refined, ground, or milled.
    - Examples: oils from plants, seeds, and nuts; vinegar made from fermenting wine; honey; maple syrup without added flavors or stabilizers

3. **Processed foods** are derived from the two previous groups, but have added salt, sugar, and/or fat. They often include 2-3 ingredients and may be eaten without further preparation.
    - Processed food examples include some of the following: cheeses, freshly made bread, canned fruits and vegetables, canned fish.
4. **Ultra-processed foods (UPFs)** have additional preservatives, artificial colors and flavors, thickeners, and artificial sweeteners. These are foods with a high content of calories, salt, sugar, and fat and very little whole food.[xv]

Effects of Food Processing on Caloric Intake

Hall and colleagues[xix] provided insight into the significance of food processing in their landmark study involving two groups who consumed either entirely ultra-processed or unprocessed diets for two weeks. All food was matched for salt, sugar, fat, and fiber, and the participants ate as much or as little as they wanted.

The mostly homemade, unprocessed foods included Greek yogurt with walnuts and fruit, spinach salad with grilled chicken, apple slices, beef roast with rice pilaf, steamed vegetables, balsamic vinaigrette, pecans, and orange slices.

The ultra-processed diet included honey nut oat cereal, flavored yogurt, blueberry muffins, canned ravioli, steak strips, mashed potatoes from a packet, baked potato chips, goldfish crackers, diet lemonade and low-fat chocolate milk.

The outcomes surprised researchers, as those consuming the ultra-processed diet ingested an additional 500 kcal/day more than those who consumed unprocessed foods. In addition, those who consumed the ultra-processed diet ate meals at a significantly faster rate (17 ± 1 kcal/min) than those who ate the unprocessed diet.[xxii]

Food Processing and the Microbiome

Unprocessed food also benefits the microbiome, according to recent research.[xx] It turns out that the body responds differently to calories consumed from high-fiber whole foods compared to ultra-processed junk foods.

For a period of 22 days, Corbin and colleagues fed 17 healthy men and women either a high fiber diet that contained resistant starch—a type of fiber found in oats, beans, lentils, chickpeas, brown rice, quinoa and whole grains—and various nuts, fruits and vegetables, or a diet containing highly processed foods. The highly processed foods were found to be absorbed more quickly in the upper portion of the gastrointestinal (GI) tract. As a result, fewer calories contributed to feeding the gut microbiome in the lower portion of the GI tract, leaving more calories added to overall calorie consumption by the individual.[xx]

In contrast, higher fiber foods were absorbed later, i.e., broken down in the large intestine or colon (where trillions of bacteria reside) by fermentation. Fermentation produces short-chain

fatty acids (acetate, propionate, and butyrate) that offer health-related benefits. Fermentation requires calories to produce the bacteria in the colon;[xx] the creation of bacteria requires calories, thereby further benefitting overall health.[xxi]

The high fiber diet prevents insulin resistance through reduced excess caloric intake, as well as benefiting the microbiome by increasing desirable fatty acids and increased GLP-132 to promote satiety – a feeling of fullness. These mechanisms are favorable in preventing obesity, T2D and ASCVD.[xxii]

Clinical Takeaways: Reducing Processed Food Consumption

Encouraging individuals to embrace healthy eating habits and reduce the consumption of processed and ultra-processed foods will improve cardiovascular health and help to prevent ASCVD.

- As with any behavior change process, helping patients reduce consumption of processed foods and increase the intake of **unprocessed or minimally processed foods** can be supported by information and resources provided by health care professionals.
- Shared decision-making between providers and patients is especially important. Providers who advocate for patients by collaborating to identify goals, weigh options, and identify next steps, will likely facilitate sustainable changes that are valued by the patient.
- Make sure to check-in with patients about their eating habits at each visit. Identify opportunities to provide reinforcement for successes as well as discussing strategies for addressing pitfalls will help patients with their long-term healthy eating habits.

Since food is often consumed in a social setting, with family or friends, helping patients to strategize in planning healthy foot options in spite of others, will reduce consumption of processed or ultra-processed food.

Related Resources

- CE Course – Behavior Change Principles in Action: Helping Patients Set Goals and Follow a Heart-Healthy Eating Plan
- CE Course – Optimal Nutrition for Cardiovascular Risk Reduction
- Heart Healthy Toolbox (pages 15-18)

References

[i] Vaduganathan M, Mensah GA, Turco JV, Fuster V, Roth GA. The Global Burden of Cardiovascular Diseases and Risk: A Compass for Future Health. *J Am Coll Cardiol*. 2022;80(25):2361-2371. doi:10.1016/j.jacc.2022.11.005

[ii] Tsao CW, Aday AW, Almarzooq ZI, et al. Heart Disease and Stroke Statistics-2023 Update: A Report From the American Heart Association [published correction appears in Circulation.

2023 Feb 21;147(8):e622] [published correction appears in Circulation. 2023 Jul 25;148(4):e4]. *Circulation*. 2023;147(8):e93-e621. doi:10.1161/CIR.0000000000001123

[iii] Ma CX, Ma XN, Guan CH, Li YD, Mauricio D, Fu SB. Cardiovascular disease in type 2 diabetes mellitus: progress toward personalized management. Cardiovasc Diabetol. 2022;21(1):74. Published 2022 May 14. doi:10.1186/s12933-022-01516-6

[iv] Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [published correction appears in J Am Coll Cardiol. 2019 Sep 10;74(10):1428-1429] [published correction appears in J Am Coll Cardiol. 2020 Feb 25;75(7):840]. *J Am Coll Cardiol*. 2019;74(10):1376-1414. doi:10.1016/j.jacc.2019.03.009

[v] Cesaro A, De Michele G, Fimiani F, et al. Visceral adipose tissue and residual cardiovascular risk: a pathological link and new therapeutic options. Front Cardiovasc Med. 2023;10:1187735. Published 2023 Jul 27. doi:10.3389/fcvm.2023.1187735

[vi] Gao L, Gou N, Yao MJ, et al., 2022. Food-derived natural compounds in the management of chronic diseases via Wnt signaling pathway. Crit Rev Food Sci Nutr, 62(17):4769-4799. doi.org/10.1080/10408398.2021.1879001

[vii] Jayedi A, Soltani S, Abdolshahi A, et al., 2020. Healthy and unhealthy dietary patterns and the risk of chronic disease: an umbrella review of meta-analyses of prospective cohort studies. Br J Nutr, 124(11):1133-1144. doi.org/10.1017/S0007114520002330

[viii] Lloyd-Jones DM, Ning H, Labarthe D, et al. Status of Cardiovascular Health in US Adults and Children Using the American Heart Association's New "Life's Essential 8" Metrics: Prevalence Estimates From the National Health and Nutrition Examination Survey (NHANES), 2013 Through 2018 [published correction appears in Circulation. 2022 Nov 15;146(20):e298]. *Circulation*. 2022;146(11):822-835. doi:10.1161/CIRCULATIONAHA.122.060911

[ix] Volpe M, Gallo G. Obesity and cardiovascular disease: An executive document on pathophysiological and clinical links promoted by the Italian Society of Cardiovascular Prevention (SIPREC). Front Cardiovasc Med. 2023;10:1136340. Published 2023 Mar 13. doi:10.3389/fcvm.2023.1136340

[x] National Institute of Diabetes and Digestive and Kidney Diseases. Overweight & Obesity Statistics. Accessed

[xi] Bhupathiraju SN, Hu FB. Epidemiology of Obesity and Diabetes and Their Cardiovascular Complications. *Circ Res*. 2016;118(11):1723-1735. doi:10.1161/CIRCRESAHA.115.306825

[xii] Poirier, P., & Eckel, R. H. (2002). Obesity and cardiovascular disease. *Current Atherosclerosis Reports, 4*(6), 448–453. https://doi.org/10.1007/s11883-002-0049-8

[xiii] Temple NJ. The Origins of the Obesity Epidemic in the USA-Lessons for Today. *Nutrients*. 2022;14(20):4253. Published 2022 Oct 12. doi:10.3390/nu14204253

[xiv] Kaufman, FR. *Diabesity: The Obesity-Diabetes Epidemic that Threatens America and What we Must do to Stop it*.Bantam Books; 2005, p. 16.

[xv] Fung, B. May 23, 2012. Infographic: A Fast Food Burger Is 3 Times Larger Now Than in the 1950s. The Atlantic. Accessed August 17, 2023.

[xvi] Martínez-González MA, Gea A, Ruiz-Canela M. The Mediterranean Diet and Cardiovascular Health. Circ Res. 2019;124(5):779-798. doi:10.1161/CIRCRESAHA.118.313348

[xvii] Levine AS, Ubbink J. Ultra-processed foods: Processing versus formulation. Obes Sci Pract. 2023;9(4):435-439. Published 2023 Jan 26. doi:10.1002/osp4.65

[xviii] Monteiro CA, Cannon G, Moubarac JC, Levy RB, Louzada ML, Jaime PC. The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. Public Health Nutrition. 2018 Jan;21(1):5-17.

[xix] Hall KD, Ayuketah A, Brychta R, et al. Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain: An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake [published correction appears in Cell Metab. 2019 Jul 2;30(1):226] [published correction appears in Cell Metab. 2020 Oct 6;32(4):690]. *Cell Metab*. 2019;30(1):67-77.e3. doi:10.1016/j.cmet.2019.05.008

[xx] Corbin KD, Carnero EA, Dirks B, et al. Host-diet-gut microbiome interactions influence human energy balance: a randomized clinical trial. Nat Commun. 2023;14(1):3161. Published 2023 May 31. doi:10.1038/s41467-023-38778-x

[xxi] Blaak EE, Canfora EE, Theis S, et al. Short chain fatty acids in human gut and metabolic health. Benef Microbes. 2020;11(5):411-455. doi:10.3920/BM2020.0057

[xxii] Wang C, Yi Z, Jiao Y, Shen Z, Yang F, Zhu S. Gut Microbiota and Adipose Tissue Microenvironment Interactions in Obesity. *Metabolites*. 2023;13(7):821. Published 2023 Jul 5. doi:10.3390/metabo13070821