

# Proceedings: American College of Occupational and Environmental Medicine: Innovation and Forward Thinking Symposium

## *Evidence-Based Nutrition Information That You Didn't Learn in Medical School*

### *Session Introduction*

Krystal Lin, MD, MSPH\*

“Let food be thy medicine and medicine be thy food.”  
—Hippocrates

Our country is facing a crisis of obesity and chronic diseases that is causing a significant burden of suffering and cost on our society, with no end in sight. At the same time, the medical profession is experiencing a worrisome crisis of physician burnout combined with a shortage in primary care that is only expected to worsen. These crises combined cause concern for a potentially dire future for both our country and healthcare system.

In this session, Dr Williams presented the evidence and key scientific benefits behind a whole-foods, plant-based diet and how such as diet has reversed coronary artery disease (CAD) and lowered cardiovascular events, including mortality in cardiac patients. Dr Lawenda discussed his personal and professional transformation through a healthy lifestyle change involving a plant-based diet. Dr Misquitta will discuss his own journey to lifestyle medicine after undergoing a coronary artery bypass (CABG) surgery, and his inspiration to spearhead Kaiser Permanente's (KP's) innovative lifestyle medicine department to combat the chronic disease epidemic. He also presented the patient outcome data from his lifestyle medicine program.

If you are not an occupational medicine physician, chances are you have not heard of our medical specialty. Occupational medicine is “devoted to prevention and management of occupational and environmental injury, illness and disability, and promotion of health and productivity of workers, their families, and communities” [1]. Over

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the last century, thanks to the epidemiological studies and advocacy work of occupational medicine physicians, workers in the US now have significantly lower risks of disabling occupational diseases such lead poisoning, asbestosis, and noise-induced hearing loss than ever before. On the one hand, we congratulate ourselves on the strides we have made, but on the other hand, we realize that obesity, diabetes, and hypertension have emerged as threats to our workforce and healthcare system.

The Centers for Disease Control and Prevention (CDC) estimates that 60% of adults have at least one chronic disease [2]. Spending by employers on individuals with chronic diseases is nearly quadruple that of healthy individuals while spending on individuals with complex chronic diseases is 8 times higher [3]. Not only are chronic diseases costly, life-expectancy and quality of life are often compromised due to complications. Because getting to the root cause of a health issue is in the DNA of occupational medicine physicians, I believe that occupational medicine can also play an essential and integral role in changing the chronic disease trajectory in our country. As I reflect on the history of occupational medicine, our workplaces have become safer because of employee empowerment, employer education, the implementation of safer work practices, and advocacy work. A similar multi-disciplinary approach may be applied to addressing our chronic disease epidemic, which can be overcome through lifestyle interventions and nutrition literacy.

Occupational medicine focuses on ensuring a healthy, productive workforce, which is only possible if we instill evidence-based food and nutrition information, and healthy lifestyle interventions. There is no better venue to disseminate such information than the workplace because an average person spends 17 minutes with a doctor a year compared with over 2,000 hours a year spent at work. I was compelled to bring the first-ever lifestyle medicine session focusing on whole-food, plant-based eating to the American Occupational Health Conference as a call to action to my colleagues. Clinical occupational medicine physicians are in the position to incorporate nutrition and lifestyle counseling during pre-placement, fitness-for-duty evaluations, and possibly during work injury evaluations when appropriate. The Corporate Medical Directors and Chief Medical Officers of corporations are in influential roles to help make employee health and wellness a corporate priority.

The session was a huge success, as evidenced by the overwhelmingly positive feedback from our attendees on the continuing medical education (CME) evaluation. Ninety-seven percent of our attendees agreed or strongly agreed that they “obtained information and ideas that will be useful in [their] work,” and 99% of our attendees agreed or strongly agreed that overall, they were “satisfied with the learning experience that [they] received from the session.”

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Steven Lawenda, MD

It was an honor to speak recently alongside my esteemed Lifestyle Medicine colleagues Dr Rajiv Misquitta and Dr Kim Williams at the 2019 American Occupational Health Conference (AOHC), considered to be the largest conference of occupational and environmental health professionals in the world. It was a particularly exciting moment given that we were told our presentation was the first in the history of this conference to formally discuss plant-based nutrition, or the notion of food as medicine for that matter.

My presentation highlighted the importance of why we as physicians need to heal ourselves and explained the powerful impact plant-based nutrition can have on both ourselves as well as our patients, and how it can restore the joy in medicine. I started the talk with my personal story of health transformation.

As I was watching my father suffer with severe complications from diabetes and heart disease, I worried I would follow in his footsteps. I was obese myself, with prediabetes, fatty liver, gastroesophageal reflux disease (GERD), and symptoms of sleep apnea. I feared I could die young and suddenly of a myocardial infarction (MI), given that my father had his first MI at age 45. Meanwhile, I was also struggling with professional burnout and felt I was not a good example to my patients. As a family medicine physician, I was seeing the victims of the obesity and chronic disease epidemic on the front lines, and all I knew to do for them was prescribe pills, as I watched them often gain even more weight and become increasingly ill.

After learning about the benefits of plant-based nutrition, I challenged myself to change my lifestyle. After 8 months, I lost 75 pounds, I reversed my prediabetes and fatty liver, my GERD and symptoms of sleep apnea resolved, and my systolic blood pressure (BP) dropped 20 points. With this new knowledge and personal success, I regained hope and optimism, and a sense of freedom—freedom from what I thought was my genetic fate, and freedom in the sense that with this lifestyle, I was free to eat without counting calories, measuring portions, or going hungry.

With this new knowledge and a jolt of optimism, I was compelled to bring what I had learned to my patients. I created a Lifestyle Medicine program named Life 180, centered around plant-based nutrition. I shared some of the data highlighting the success of our program, especially with respect to diabetes, including that over half of our patients on insulin have been able to discontinue it *entirely* while *improving* their glycemic control.

I also shared several examples of inspiring health transformations, including the story of a female patient in her mid-70s who was obese and confined to a scooter (for long distances) or a walker (for short distances) and who was dependent on oxygen due to chronic obstructive pulmonary disease (COPD). In under a year of plant-based nutrition, she lost 83 pounds, overcame the need for oxygen, and overcame the need for her walker and scooter. She reported feeling as if she was 25 years younger. Her daughter, inspired by her mother's success, followed suit and also lost over 60 pounds in spite of having previously had gastric sleeve surgery, and her hypertension and chronic sciatica pain completely resolved.

I also shared the story of a man in his 60s who suffered with multi-vessel coronary artery disease, causing him daily angina from simply walking across a parking lot. He was prescribed standard medical therapy, a diet focused on chicken and fish, and exercise—yet these interventions were not working for him. He was advised he would need coronary artery bypass graft (CABG) surgery. Yet after 2 months of plant-based nutrition, his angina *completely* resolved, and he avoided the need to undergo the invasive and risky surgery.

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Lastly, I shared the story of a man in his 50s with type 1 diabetes, peripheral neuropathy with severe pain that required opiate pain medication in order for him to function, and erectile dysfunction, who had a large 10-cm non-healing and infected diabetic foot ulcer. He was advised he would require amputation. Yet after 3 months of plant-based nutrition, his foot ulcer healed, and he avoided the amputation. In addition, his neuropathy pain resolved by 90%, which allowed him to discontinue his opiate pain medication, and his erectile dysfunction resolved as well.

I concluded by emphasizing the need for us as physicians to take care of ourselves, learning and applying optimal nutrition to our own lives, so that we can be dependably well for our families and our patients, and furthermore so that we can be role models for our patients and true healers by treating the *root cause* of obesity and chronic disease—the food. It is precisely when we take these steps, that we can truly and profoundly transform lives and regain the joy in medicine. And with the epidemic of obesity and chronic disease at crisis level and only worsening over time, we can't wait much longer to take that next step. The time is now.

### ***Nutrition and cardiovascular disease: Review of the published literature***

Kim Allan Williams, Sr, MD, MACC, FAHA, MASNC

#### **Introduction**

Heart disease has been the leading cause of death in the United States since 1918. About 630,000 Americans died from heart disease in 2015, 366,000 from coronary artery disease. It is the leading cause of death for people of most racial/ethnic groups in the United States, including African Americans, Hispanics, and whites, with an estimated cost of over \$200 billion annually in healthcare services, medications, and lost productivity. After 4 decades of decline, heart disease deaths rose in 2015 by 1%. This trend has been attributed to the obesity epidemic [1].

#### **Obesity and Nutrition**

The nutritional aspects of obesity revolve around the principle of balancing caloric intake with caloric expenditure. The increased availability of affordable palatable and high-calorie foods along with decreased physical demands of many jobs have fueled the epidemic of obesity, and with this the consequent increases in hypertension and diabetes mellitus [2].

Multiple nutritional studies have demonstrated weight loss, but they are typically temporary and not sustained. One prospective randomized trial [3] compared 4 diets for weight loss in moderately obese patients: Atkins (low carbohydrate), Ornish (vegetarian, low fat), Weight Watchers (calorie restriction), and Zone (macronutrient balance) diets.

Adherence to each diet was moderate and decreased over time, with only about half of the original cohort remaining in each group. The Atkins and Ornish diets had the highest discontinuation rates (48% and 50%, respectively), compared with Zone and Weight Watchers (35% each). When evaluated for available data, each diet resulted in substantial weight loss, but at 1 year, the weight reduction occurred with the Ornish diet.

A second randomized trial [4] compared 5 dietary patterns over a 6-month period: standard (omnivore), semi-vegetarian (reduced animal products), pescovegetarian (vegetarian plus fish), vegetarian (includes dairy), and vegan (excludes all animal products). This showed 79% adherence and significant weight loss in each group, with the most sustained loss (-3.1%, -3.1%, -3.1%, -6.2%, and -7.5% of weight) occurring in the vegetarian and vegan groups.





## ***Ketogenic diets***

Beyond short-term weight loss, there is evidence that dietary patterns that focus on low intake of carbohydrates and a high intake of animal fat and protein are associated with increased total mortality if they are pursued for extended periods [5], particularly if used in post-myocardial infarction [6]. In one meta-analysis of 4 low-carbohydrate prospective randomized studies [7], these diets were associated with a 31% higher risk of all-cause mortality.

## **Nutrition in Hypertension**

As noted in prior guidelines [8], lifestyle and non-pharmacologic intervention can result in significant reduction in systemic blood pressure in patients with systemic hypertension. This includes adherence to a DASH dietary pattern (Dietary Approaches to Stop Hypertension) with a diet rich in fruits, vegetables, whole grains, and low-fat dairy products with a reduced content of saturated fat, resulting in approximately an 11 mm Hg decrease in systolic blood pressure.

In a meta-analysis of 7 prospective randomized trials and 32 observational studies [9], vegetarian diets resulted in an average of 5 mm Hg and 7 mm Hg reductions in systolic pressure, respectively. In the large Adventists Health Studies' prospective observational cohort, the incidence of hypertension was between 23 to 75% lower with progressively more vegetarian diets [10]. In the INTERMAP micronutrient studies [11], this has been attributed to the antihypertensive effect of glutamic acid in vegetable protein.

## **Nutritional Effects on Cholesterol**

While the beneficial effects of soluble fiber, monounsaturated and polyunsaturated fats, and deleterious effects of both trans- and saturated fats, on serum cholesterol have generally been agreed upon, the relationship between ingested cholesterol and serum cholesterol has become controversial in recent years [12], with a focus short-term studies of risk factors rather than long-term outcomes [13]. Considering the saturation of the Niemann-Pick C1-Like 1 receptors in the small bowel, there is a progressively flat relationship between ingested cholesterol and serum cholesterol. Large increases in serum cholesterol are noted in "hyperresponders," particularly those who have a lower cholesterol baseline degree of cholesterol consumption [14]. The relationship between ingested cholesterol and the consequent increase in serum cholesterol is essentially linear ( $y = 0.0974x$ ) at lower levels [15]. In a meta-analysis of 224 studies of cholesterol "real-world" dietary interventions [16], there was a 2.2 mg/dL decrease in serum low-density lipoprotein (LDL) for every 100 mg lowering of ingested cholesterol.

Therefore, the Institute of Medicine has recommended that "saturated fatty acid, trans fatty acid, and cholesterol consumption be as low as possible while consuming a nutritionally adequate diet" [17].

In terms of dietary patterns, the randomized prospective PORTFOLIO diet, high in plant sterols, soy protein, viscous fibers, and almonds has been shown to reduce both low-density lipoprotein cholesterol (LDLc) and high-sensitivity C-reactive protein (hs-CRP) equally as did low-dose lovastatin therapy [18].

Similarly, in a meta-analysis of 30 observational studies and 19 clinical trials [19], consumption of vegetarian diets compared with omnivorous diets in observational studies and clinical trials was associated with lower mean concentrations of total cholesterol (-29.2 and -12.5 mg/dL,  $P < 0.001$ ), LDLc (-22.9 and -12.2 mg/dL,  $P < 0.001$ ), and high-density lipoprotein cholesterol (HDLc) (-3.6 and -3.4 mg/dL,  $P < 0.001$ ), respectively. Triglyceride differences were -6.5 ( $P = 0.092$ ) in observational studies and 5.8 mg/dL ( $P = 0.090$ ) in intervention trials.

## **Diabetes Mellitus**

Despite the focus on refined carbohydrates and fat consumption and consequent in-



sulin resistance, recent literature in nutrition has focused on the role of red meat consumption on elevating the risk of type 2 diabetes mellitus [20]. This includes 3 meta-analyses [21,22,23] of prospective cohorts with strongly positive associations, which is only partially mediated by increased body weight [23].

Further, glycemic control can be improved (or regained) with a reduction of red meat consumption [23], or a diet devoid of animal products and low in saturated fat [20]. When polyunsaturated vegetable fat is substituted for sugar, glycemic control is improved [24].

### CV Events and Mortality

Recent literature has focused on several eating patterns, food substances, micronutrients, and metabolic consequences in relation to the development of cardiovascular events and mortality.

Sugar and artificially sweetened beverages have been correlated with increasing the development of type 2 diabetes mellitus, and therefore cardiovascular risk, with an increase in the frequency of diabetes by 20% with just one daily serving of these sweetened beverages [25].

In several cohort studies, consumption of sugar has been associated with increased mortality. In the Nurses' Health Study, a glycemic load resulted in a 22% increase in mortality while cholesterol consumption increased mortality by only 17%, and mortality was reduced by 16% with vegetable fiber consumption [26].

In the REGARDS trial [27], the Southern dietary pattern was identified as substantially increasing health risks, including a 56% higher risk of heart disease and a 30% higher risk of stroke. This pattern consisted of more fried food, added fats, organ and processed meats, and sugar sweetened beverages. It has been noted that consuming an unhealthy plant-based diet [28] with similar elements to the Southern diet, including juices/sweetened beverages, refined grains, potatoes/fries, and sweets, results in increased coronary events exceeding the point estimate for that associated with consumption of animal products.

Correlation between dietary elements and cardiovascular mortality were also examined in a recent publication from the National Health and Nutrition Examination Surveys or NHANES [29], indicating that high sodium content (>2000 mg daily), red meat (>14 g/day), sugar sweetened beverages, or processed red meat consumption, in any amount, were associated with cardiovascular death.

The Mediterranean diet was tested in the PREDIMED trial [30], a prospective randomized study that was recently retracted and republished after reanalysis with correction to the randomization process. This demonstrated a 30% reduction in the combined end point myocardial infarction, stroke, and cardiovascular mortality. However, the benefit of this dietary pattern—with either extra virgin olive oil or nuts—was confined statistically to stroke reduction, with no improvement over the control diet for mortality or myocardial infarction. When the PREDIMED data was reanalyzed for the “provegetarian” food pattern (more vegetable consumption vs. less animal product consumption), a significant mortality reduction (41%) was noted in the quintile with the highest vegetarian score [31].

A comparison of plant and animal protein from the Adventist Health Study-2 cohort [32] similarly indicated that using meat for protein increased mortality by 61% while replacing meat with nuts and seeds reduce mortality by 40%.

The prospective cohort study of US healthcare professionals [33] with at least one risk factor, including over 130,000 nurses and physicians, indicated that replacement of animal protein with plant protein would reduce cardiovascular mortality and all-cause death, with poultry and fish increasing mortality by 6%, dairy by 8%, unprocessed red meat by 12%, eggs by 19%, and processed red meat by 34%. Overall,



plant protein reduced mortality by 10% for every 3% energy increment replacement for animal protein.

Intestinal microbiota and dietary phosphatidylcholine [34], ingested with animal products, such as meat, eggs, and cheese for example, has been identified as a novel mechanism for the development of myocardial infarction, stroke, and death, by accelerating arterial plaque formation along with increased platelet adhesiveness generated by trimethylamine-N-oxide (TMAO). In addition to ischemic events, TMAO has been correlated with mortality in congestive heart failure [35].

The relative risk of processed versus unprocessed red meat associated with development of heart failure, coronary heart disease, hemorrhagic stroke, ischemic stroke, and diabetes mellitus has been examined in a meta-analysis, indicating that TMAO, heme iron, nitrosamine, nitrates, nitrate and nitroso compounds, saturated fat, advanced glycation end products, and branched amino acids represent possible mediators [36]. Similarly, the NIH-AARP diet and health study found an association between all-cause mortality with the total and processed red meat attributable to nitrate intake and iron [37].

Sensitization to red meat—measured by immunoglobulins against the mammalian oligosaccharide galactose- $\alpha$ -1,3-galactose—has been associated with accelerated atherosclerosis and plaque instability [38]. This may represent another method to identify patients who should avoid consumption of mammalian meat due to risk of ischemic heart disease, a modifiable risk factor.

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***Reversing diabetes, obesity and coronary artery disease:  
Preliminary outcomes of the Health Achieved through  
Lifestyle Transformation (HALT) clinical trial***

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Ten years ago, at the age of 40 on my way to work, I experienced shortness of breath and chest pressure. I managed to stumble into the emergency room at my facility where an electrocardiogram revealed that I was having an anterior myocardial infarction. I was rushed into the catheterization laboratory and had two stents placed into my left anterior descending (LAD). This prompted me to switch my diet as per the recommendation of the American Heart Association at that time. Only a few months later, the symptoms of angina returned and after an evaluation by my cardiologist, I underwent a 5-vessel coronary artery bypass surgery. After pouring through the literature it was clear that a low-fat, plant-based diet could have powerful effects on the reversal of coronary artery disease (CAD) [1,2]. Furthermore, I read that Dr Neal Barnard had also shown improvement in diabetes on a low-fat, plant-based diet as well [3].

My personal experience motivated me to develop a clinical trial called Health Achieved through Lifestyle Transformation (HALT) at our South Sacramento Kaiser Permanente Medical Center. I sought to develop a study to explore the possibility of achieving disease reversal on groups of patients with CAD and diabetes in a structured managed care setting. An initial 2-month pilot revealed success, at least for the short term, on patients with CAD and diabetes, and we sought to look at long-term outcomes. HALT is a 20-week program that comprises of a weekly group session that alternates with a weekly 20-minute telephone appointment. The nutrition and exercise sessions are led by a health educator while some of the behavioral sessions are led by a psychologist. The curriculum covers nutrition focused around a low-fat (10% calories from fat), whole-food, plant-based diet, exercise, and stress reduction. The program is led by a board-certified lifestyle medicine physician who performs an initial assessment of all patients in an office visit, reviews labs and health metrics, and is available as a resource for staff and patients. We enrolled patients with coronary artery disease and/or type 2 diabetes. All patients interested in the program were first screened using the following confidence scale: How confident are you on being able to switch to a whole-food, plant-based diet? If they scored 7 and above, they were enrolled in the study. Behavioral change is not easy and our intent was to recognize patients who were ready to make a change and provide the necessary support. At the end of the 20-week program, the patients were also given the option of attending weekly maintenance classes.

For the first 137 participants, the data were reviewed at 6 months. In this cohort, 69% were male while 39% were female. Seventy-five percent had a BMI between 25 and 29.9 while 25% had a BMI over 30. Average class attendance was 80% and total participant retention was 82%. Our food frequency surveys indicated that patients were eating more vegetables and fruit and minimal animal protein at the 6-month point. The average weight loss at 6 months was 15.5 lbs or 7% of total body weight. Around 91% of the participants lost weight with a range of 0.2 lbs to 78 lbs. The average reduction in BMI at 6 months was 2.5 kg/m<sup>2</sup>. Around 87% of patients reduced their waist circumference. The average reduction in waist circumference in 6 months was 2.3 inches with a range of 0.5 inches to 9 inches. This is particularly important as visceral fat is known to be a risk factor for diabetes and CAD. The average HgbA1c dropped from 8.3% to 7.6% units. Three patients were able to eliminate over 100 units of daily insulin from their regimen while others saw reduction. The average high-sensitivity C-reactive protein (hs-CRP) dropped by 0.4 mg/L. The average change in

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resting energy expenditure dropped from 1729 kcal/day to 1650 kcal/day. This is not unexpected with a reduced calorie diet. One patient who had stable angina at enrollment reported that his chest discomfort had resolved and he was now able to run 7 miles at least 3 times a week.

Our preliminary data support the concept that a low-fat, whole-food, plant-based diet, exercise, and stress reduction is a feasible option for patients in a structured managed care setting and has beneficial results on disease reversal for patients with coronary artery disease, diabetes, and obesity. We have enrolled the cohort in a longer-term study and plan to follow these patients for at least 1 year and collect long-term outcomes.

## References

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