ANALYTIC REVIEW

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Lifestyle Is the Medicine, Culture Is the Spoon: The Covariance of Proposition and Preposition*

Abstract: *We have known now for a span of decades that the leading causes of premature death and chronic disease in the United States and increasingly around the world are behavioral factors under our potential control. We have as well consistent evidence from diverse sources indicating that amelioration of a short list of such factors, with an emphasis on dietary pattern, physical activity, and tobacco use, can slash rates of chronic disease and premature death alike. But choices people make are governed ultimately by choices people have. In an obesigenic and morbidigenic environment that conspires mightily against healthful living, salutary behavior change is all too often forestalled. Constructive and compassionate guidance from clinicians can help confront this challenge, and the case is made that lifestyle in medicine is of real value. But the case is also made that lifestyle is not fundamentally a clinical issue but a cultural one. For the full promise of lifestyle medicine to be realized, it must be lifestyle as medicine—and spoons full of cultural change will be required to make that medicine go down.*

Keywords: lifestyle; diet; physical activity; culture; health

The Causes of Causes

Prior to 1993, the only established way to elaborate the leading causes of death in the United States was to note the diseases listed as "causes" on death certificates. The most common entry was heart disease, the second most common was cancer, and so on. The list of chronic diseases comprising the leading causes of premature death has been relatively stable for decades, even as the global toll of such diseases has risen alarmingly.[1]

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But a little more than 2 decades ago, in 1993, the view of that list was irrevocably altered by the seminal work of William Foege and J. Michael McGinnis, published in the *Journal of the American Medical Association* and titled, "Actual Causes of Death in the United States."[2] The analysis by McGinnis and Foege led them to what they called "root" causes. Diseases were not really causes, they reasoned; they were effects. And the salient question for public health was, "Effects of what? What was causing the diseases that were, in turn, causing premature deaths?" And, because the leading causes of premature death were chronic conditions, the question could be expanded: "What was causing the diseases that were taking both years from life, and life from years?"

The answer they famously disclosed was a list of 10 factors we overwhelmingly have the capacity to control in our daily lives. Although the full list of factors is of interest to the field of lifestyle medicine, of even greater salience was the predominant influence

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in 1990 of just the first 3: tobacco use, dietary pattern, and physical activity. These 3 factors alone accounted for nearly 80% of the total annual burden of premature death and an at least comparable portion of chronic disease in the United States.

A decade after the original publication, researchers at the Centers for Disease Control and Prevention (CDC) replicated the McGinnis and Foege analysis, largely replicating the findings as well.[3] Tobacco use, poor diet, and lack of physical activity remained the leading causes of premature death in the epidemiological landscape of 2000, still accounting for almost 8 in 10 premature deaths. All that had changed over the span of a decade was that the gap between tobacco use as the number 1 root cause and the combination of poor diet and physical inactivity as number 2 had narrowed, for one good reason and one bad. The good reason was the strides made in that decade against tobacco use; the bad was lack of progress related to diet or physical activity patterns, and worsening epidemics of obesity and diabetes as a result of this societal neglect.[4-6]

The Remedy

If the decade from roughly 1990 to 2000 clarified the principal causes of chronic disease and premature death, the decade that followed provided equally clear elucidation of the cures. Evidence that roughly 80% of all chronic disease could be attributed to a short list of lifestyle factors hinted at a luminous promise within the dark clouds of modern epidemiology: optimize those same behaviors, and 80% of all chronic disease should be preventable.[7] Study after study has suggested exactly that.

Population-based research published in 2009 by Ford et al[8] showed that people who ate well, exercised routinely, avoided tobacco, and controlled their weight had an 80% lower probability across their entire life spans of developing any major chronic disease—heart disease, cancer, stroke, diabetes, dementia, and so on—than those who smoked, ate badly, did not exercise, and lost control of their weight. Flip the switch on any one of these factors from bad to good, and the lifetime probability of any serious chronic disease was reduced by nearly 50%. But the salutary application of all 4 factors was associated with a greater net benefit than perhaps any advance in the history of medicine.

These very findings have been replicated again and again. A 2010 article in the *Archives of Internal Medicine*, reporting results of a study of some 5000 citizens of the United Kingdom followed for 20 years,[9] reaffirmed the findings of Ford et al.[8] So, too, did a 2011 study, reporting results from a US cohort in the journal *Cancer Epidemiology Biomarkers & Prevention*.[10] Before, and since, a steady drumbeat of replication has been published, representing diverse research methods and populations around the globe.[11-14]

The remarkably potent influence of a very short list of lifestyle factors on medical destiny extends even to the actions of DNA. A study by Ornish et al[15,16] in 30 men with early-stage prostate cancer demonstrated the capacity of a lifestyle intervention program to alter gene expression in a manner suggestive of favorable effects on cancer prognosis. Other investigators have published related findings,[17,18] establishing the primacy of epigenetics and the capacity to "nurture nature."[19] Whereas DNA may have been mistaken for destiny at the excited onset of the genomic age, there is now increasing recognition that what happens to genes generally matters more than the genes we happen to have. DNA, per se, is very rarely destiny; dinner (ie, dietary pattern) may be destiny to a far greater degree.

And so, emphatically, persuasively, and repeatedly, the definition of leading causes of death has been updated over the past 2 decades. It is not diseases, it is the factors, mostly behaviors and choices we control, that underlie diseases. Root causes we have the latent capacity to control account for an appalling loss of years from life and an even more calamitous loss of life from years.[20] It is these root causes that matter, because we can—in principle, at least—alter them at will. And thus, the leading causes of chronic disease and premature death have latent potential to be the leading cures.

For the most part, those latent cures are well understood and noncontroversial. The avoidance of tobacco may be hard to accomplish but is easy to define. So, too, is routine physical activity meeting particular recommendations for duration and intensity. Even weight control, though an outcome rather than a behavior, is defined readily, if crudely, with use of the body mass index.

That leaves dietary pattern, which has proven contentious for years.[21,22] This article is not the place to explore competing arguments about best dietary pattern for health in detail. It is, however, the place to note that such work has been done[23] and that the fundamental theme of health-promoting eating is well established and common to the variations on that theme contending for "best diet" laurels. A diet of real "food, not too much, mostly plants"[24] will indeed go a long way toward alleviating the bulk of our diet-related ills. So it is that the knowledge of what is needed to prevent 80% of chronic disease and premature death is sufficiently clear and not rate limiting. The principal challenges before us now relate to application—the translation of knowledge into the power of effective action. We are forestalled not for want of knowing where "there" is but for failing thus far to do what is required to get there from here.

Calling in the Cavalry

There is a gathering impression of both readiness, and urgency, to act on our now long-latent knowledge of disease prevention. The urgency derives from the unsustainable human and economic toll of missed opportunity. The trials and tribulations of health care reform in the United States are a matter of public record.[25] Equally clear is that the associated acrimony and conflict derive particularly from concerns about money. Yet there is reason to worry that almost any recapitulation of what is fundamentally a "disease care" system is economically moot should current

epidemiological trends persist. Whereas the approximately 27 million people diagnosed with diabetes in the United States today, for example, represent an already challenging financial burden, the CDC projects that as many as 1 in 3 Americans will be diabetic by the mid-21st century.[26] Alarming progress toward that ominous projection has already been documented.[27] Should that grim prediction come to pass, there will be more than 100 million people with diabetes in the United States. Projections regarding cancer and dementia[28-31] are, if anything, even greater cause for concern. Thus, urgency regarding the application of lifestyle medicine to the prevention of chronic disease pertains at least partly to the recognition that the solvency of our nation may be at stake.

The clinical urgency relates more to the human than financial costs of the prevailing status quo and is at least comparably compelling. Along with alarming projections about diabetes and dementia comes recent evidence of ever more cardiovascular risk factors in ever younger people[32] and even evidence of a rising incidence of stroke in American children between the ages of 5 and 14.[33,34] Although the overall prevalence of obesity may have stabilized in adults and children alike,[35-37] the rates of severe obesity—the variety most likely to induce serious metabolic complications—are rising briskly in both.[38] The mortality toll of that obesity may be greater than previously recognized when the analysis is adjusted for trends over time in sequential birth cohorts.[39]

Readiness for action and the conversion of what we have long known into what we more routinely do[40] derives not only from the pertinent urgency, but also a confluence of clinical and societal themes and trends. One salient theme is the central role of the patient, which in turn places an emphasis on lifestyle practices and holistic models of care.[41] Predictably, patient centeredness advances the cause of lifestyle medicine because lifestyle resides much more in the purview of the patient than the provider. Yet another theme is the engagement of clinicians in effective lifestyle counseling, with corresponding changes in reimbursement models. Medicare statutes were updated to allow for reimbursement of weight management/lifestyle counseling[42]; the private insurance industry has placed an increasing emphasis on wellness and prevention; the affordable care act does so as well[43]; and within the past year, the American Medical Association recognized obesity as a disease in an ostensible effort to direct more clinical attention and effort to its treatment, control, and prevention.[44]

All this is good, as far as it goes. But if the hope is to turn the United States into a Blue Zone,[45] where that 80% reduction in chronic disease is fully realized, it almost certainly does not go far enough.

Blue Zones and Big Pictures

The Blue Zones are those societies notable for exceptional longevity and vitality. Related work attributes such advantages to lifestyle but not to medicine. Clinical counseling does not figure among the explanations for Blue Zone blessings; rather, the explanations all reside at the level of culture.[45]

If anything, our culture is prone to "over-medicalization,"[46] for reasons we might readily suppose. Even the currently massive societal preoccupation with so-called "health care" reform[43] is principally about access to care for the treatment of illness and much less about building health at its origins in daily living.

We have long had indications of this societal bias. Nearly 2 decades of effort were required before clear evidence supporting a lifestyle intervention as an alternative to coronary bypass surgery resulted in comparable reimbursement.[47] Our society readily accepts the bill for bariatric surgery in obese adolescents while neglecting potentially better, less medical remedies.[48] To the extent that we medicalize obesity, we may divert both attention and resources away from cultural and environmental responses to it.[49]

The importance of the built environment[50] and public polices[51] in the epidemiology of obesity and chronic disease are well established. There is evidence as well of the favorable impact of community-wide interventions that treat a population, rather than an individual, as the patient.[52] And, of course, there is the flagrant if uncontrolled evidence of our recent cultural history. Obesity and its metabolic sequelae were relatively rare before the advent of highly obesigenic environmental and cultural conditions and became prevalent in tandem with their proliferation. During this time, genes and metabolic pathways changed not at all, whereas prevailing dietary and activity patterns changed substantially. Purists might fuss over the want of randomized clinical trials to establish true causality here, but there are no clinical trials to substantiate the link between striking a match and starting a fire either.

Back to the Future

Lifestyle medicine is new, but it is also ancient. We are rediscovering through modern epidemiological research much of what was apparent to Hippocrates on the basis of astute observation. The primacy of lifestyle medicine thus represents a confluence of science and sense, the modern and the ancient, a time long gone and a time whose time has come.

Lifestyle Medicine: the Covariance of Propositions and Prepositions

The role of clinicians in lifestyle medicine varies with circumstance. In the case of advanced metabolic complications, it is inevitably a large role. In the case of lifestyle and weight management counseling, it is a supporting role but an important one nonetheless. We can and should cultivate widespread competency in constructive, compassionate, and streamlined counseling.[53] We can, and should, design programs for finding health and losing weight that involve clinicians strategically

while sparing them excessive burdens of time and effort.[54]

There is a strong case for better application of lifestyle in medicine, and the engagement of clinicians in the delivery of effective programming and constructive counseling is thus a welcome trend, as are the improving prospects for reimbursement in this area. But populations around the world enjoying the longest, happiest, most vital lives do not attribute such blessings preferentially to clinical care but rather to culture. If lifestyle is the medicine, culture is the best of spoons. And so it is that lifestyle in medicine is a valuable, and essential, step, but only an initial step. Lifestyle in medicine, laudable though it may be, and preferable as it is to the omission of lifestyle from medicine, raises the prospect of overmedicalization if we stop there. If we stop there, we fail to concede that lifestyle actually happens not in hospitals and clinics but in the places where people live and learn, work and play, and eat and pray and love.

The true prize—more years in life, more life in years—resides with lifestyle as medicine, reverberating throughout our culture. Lifestyle medicine practitioners are thus obligated to do more than practice. We are called on to preach as well and to innovate empowering programs[55] from the vanguard of true health care reform, rallying the population to nothing less than a cultural revolution that reveres and enables vitality.[56]

Lifestyle medicine is, clearly, the best of propositions. But the implications of that proposition vary somewhat with our choice of preposition.

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References

1. Global Burden of Disease Study, 2010. http://www.thelancet.com/themed/global-burden-of-disease. Accessed February 6, 2014.
2. McGinnis J, Foege W. Actual causes of death in the United States. *JAMA*. 1993;270:2207-2212.
3. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004;291:1238-1245.
4. Katz DL. Childhood obesity trends in 2013: mind, matter, and message. *Child Obes*. 2013;9:1-2.
5. Gregg EW, Cadwell BL, Cheng YJ, et al. Trends in the prevalence and ratio of diagnosed to undiagnosed diabetes according to obesity levels in the U.S. *Diabetes Care*. 2004;27:2806-2812.
6. Gregg EW, Cheng YJ, Cadwell BL, et al. Secular trends in cardiovascular disease risk factors according to body mass index in US adults. *JAMA*. 2005;293:1868-1874.
7. Katz DL, Colino S. *Disease Proof*. New York, NY: Hudson Street Press; 2013.
8. Ford ES, Bergmann MM, Kroger J, Schienkiewitz A, Weikert C, Boeing H. Healthy living is the best revenge: findings from the European Prospective Investigation Into Cancer and Nutrition-Potsdam study. *Arch Intern Med*. 2009;169:1355-1362.
9. Kvaavik E, Batty GD, Ursin G, Huxley R, Gale CR. Influence of individual and combined health behaviors on total and cause-specific mortality in men and women: the United Kingdom health and lifestyle survey. *Arch Intern Med*. 2010;170:711-718.
10. McCullough ML, Patel AV, Kushi LH, et al. Following cancer prevention guidelines reduces risk of cancer, cardiovascular disease, and all-cause mortality. *Cancer Epidemiol Biomarkers Prev*. 2011;20:1089-1097.
11. Schellenberg ES, Dryden DM, Vandermeer B, Ha C, Korownyk C. Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Ann Intern Med*. 2013;159:543-551.
12. Gregg EW, Chen H, Wagenknecht LE, et al. Association of an intensive lifestyle intervention with remission of type 2 diabetes. *JAMA*. 2012;308:2489-2496.
13. Loef M, Walach H. The combined effects of healthy lifestyle behaviors on all cause mortality: a systematic review and meta-analysis. *Prev Med*. 2012;55:163-170.
14. Kono Y, Yamada S, Yamaguchi J, et al. Secondary prevention of new vascular events with lifestyle intervention in patients with noncardioembolic mild ischemic stroke: a single-center randomized controlled trial. *Cerebrovasc Dis*. 2013;36:88-97.
15. Ornish D, Magbanua MJ, Weidner G, et al. Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention. *Proc Natl Acad Sci U S A*. 2008;105:8369-8374.
16. Ornish D, Lin J, Chan JM, et al. Effect of comprehensive lifestyle changes on telomerase activity and telomere length in men with biopsy-proven low-risk prostate cancer: 5-year follow-up of a descriptive pilot study. *Lancet Oncol*. 2013;14:1112-1120.
17. Freedland SJ, Aronson WJ. Dietary intervention strategies to modulate prostate cancer risk and prognosis. *Curr Opin Urol*. 2009;19:263-267.
18. Lin DW, Neuhouser ML, Schenk JM, et al. Low-fat, low-glycemic load diet and gene expression in human prostate epithelium: a feasibility study of using cDNA microarrays to assess the response to dietary intervention in target tissues. *Cancer Epidemiol Biomarkers Prev*. 2007;16:2150-2154.
19. Katz DL. How you nurture your health could alter your genetic nature. *The Huffington Post*. http://www.huffingtonpost.com/david-katz-md/nature-nurture-fate_b_681732.html. Accessed February 6, 2014.
20. Institute of Medicine. U.S. health in international perspective: shorter lives, poorer health. http://www.iom.edu/Reports/2013/US-Health-in-International-Perspective-Shorter-Lives-Poorer-Health/Report-Brief010913.aspx. Accessed February 6, 2014.
21. Katz DL. Competing dietary claims for weight loss: finding the forest through truculent trees. *Annu Rev Public Health*. 2005;26:61-88.
22. Katz DL. Pandemic obesity and the contagion of nutritional nonsense. *Public Health Rev*. 2003;31:33-44.
23. Katz DL. Can we say what diet is best for health? *Annu Rev Public Health*. In press.
24. Pollan M. Unhappy meals. *New York Times Magazine*. 2007.
25. The New York Times. Times topics: health care reform. http://topics.nytimes.com/top/news/health/diseasesconditionsandhealthtopics/health_insurance_and_managed_care/health_care_reform/. Accessed February 6, 2014.
26. Centers for Disease Control and Prevention. Number of Americans with diabetes projected to double or triple by 2050. http://www.cdc.gov/media/pressrel/2010/r101022.html. Accessed February 6, 2014.
27. Centers for Disease Control and Prevention. Increasing prevalence of

diagnosed diabetes: United States and Puerto Rico, 1995-2010. *MMWR Morb Mortal Wkly Rep*. 2012;61:918-921.

28. Mitka M. IOM report: aging US population, rising costs, and complexity of cases add up to crisis in cancer care. *JAMA*. 2013;310:1549-1550.
29. Akushevich I, Kravchenko J, Ukraintseva S, Arbeev K, Yashin AI. Time trends of incidence of age-associated diseases in the US elderly population: Medicare-based analysis. *Age Ageing*. 2013;42: 494-500.
30. Wimo A, Winblad B, Jonsson L. The worldwide societal costs of dementia: estimates for 2009. *Alzheimers Dement*. 2010;6:98-103.
31. Steenland K, MacNeil J, Vega I, Levey A. Recent trends in Alzheimer disease mortality in the United States, 1999 to 2004. *Alzheimer Dis Assoc Disord*. 2009;23:165-170.
32. Balakrishnan PL. Identification of obesity and cardiovascular risk factors in childhood and adolescence. *Pediatr Clin North Am*. 2014;61:153-171.
33. Pearson V, Ruzas C, Krebs NF, Goldenberg NA, Manco-Johnson MJ, Bernard TJ. Overweight and obesity are increased in childhood-onset cerebrovascular disease. *J Child Neurol*. 2013;28:517-519.
34. George MG, Tong X, Kuklina EV, Labarthe DR. Trends in stroke hospitalizations and associated risk factors among children and young adults, 1995-2008. *Ann Neurol*. 2011;70:713-721.
35. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA*. 2012;307:483-490.
36. Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA*. 2012;307:491-497.
37. Trust for America's Health. F as in fat: how obesity threatens America's future, 2013. http://healthyamericans.org/report/108. Accessed February 6, 2014.
38. Kelly AS, Barlow SE, Rao G, et al. Severe obesity in children and adolescents: identification, associated health risks, and treatment approaches: a scientific statement from the American Heart Association. *Circulation*. 2013;128:1689-1712.
39. Masters RK, Reither EN, Powers DA, Yang YC, Burger AE, Link BG. The impact of obesity on US mortality levels: the importance of age and cohort factors in population estimates. *Am J Public Health*. 2013;103:1895-1901.
40. Katz DL. Life and death, knowledge and power: why knowing what matters is not what's the matter. *Arch Intern Med*. 2009;169:1362-1363.
41. Frampton SB, Charmel PA. *Putting Patients First*. 2nd ed. San Francisco, CA: Jossey-Bass; 2008.
42. Medical Economics. Medicare to reimburse for obesity screening and counseling. http://medicaleconomics.modernmedicine.com/medical-economics/news/modernmedicine/welcome-modernmedicine/medicare-reimburse-obesity-screening-an.
43. US Department of Health and Human Services. Affordable Care Act. http://www.hhs.gov/healthcare/rights/. Accessed February 6, 2014.
44. Pollack A. A.M.A. recognizes obesity as a disease. *The New York Times*. June 18, 2013.
45. Buettner D. *The Blue Zones*. Washington, DC: National Geographic; 2008.
46. Welch HG, Schwartz L, Woloshin S. What's making us sick is an epidemic of diagnoses. *The New York Times*. January 2, 2007.
47. Preventive Medicine Research Institute. Ornish programs reimbursed by Medicare. http://www.pmri.org/certified_programs.html. Accessed February 6, 2014.
48. Katz DL. US News & World Report. Eat and run blog. School over scalpels. http://health.usnews.com/health-news/blogs/eat-run/2013/01/11/school-over-scalpels. Accessed March 2, 2014.
49. Katz DL. Are our children "diseased"? *Child Obes*. 2014;10:1-3.
50. Galvez MP, Pearl M, Yen IH. Childhood obesity and the built environment. *Curr Opin Pediatr*. 2010;22:202-207.
51. Friedman RR, Schwartz MB. Public policy to prevent childhood obesity, and the role of pediatric endocrinologists. *J Pediatr Endocrinol Metab*. 2008;21:717-725.
52. Bleich SN, Segal J, Wu Y, Wilson R, Wang Y. Systematic review of community-based childhood obesity prevention studies. *Pediatrics*. 2013;132:e201-e210.
53. Online Weight Management Counseling for Healthcare Providers. http://www.turnthetidefoundation.org/OWCH/index.htm. Accessed March 2, 2014.
54. RediClinic. Weigh forward. http://www.rediclinic.com/weighforward/. Accessed February 6, 2014.
55. Programs and research agenda. http://www.turnthetidefoundation.org/programs.htm. Accessed February 6, 2014.
56. Katz DL. What if health were more like wealth? *The Huffington Post*. March 9, 2012.