Marquette Elder's Advisor

Volume 12
Issue 1 *Fall*

Article 8

Fall 2010

Prevention of Illness

Paul Bernstein

PREVENTION OF ILLNESS

Dr. Paul Bernstein*

Overusing Scans Adds to Cancer Risk, a recent *Milwaukee Journal Sentinel* front page headlined warned.[1] Too much radiation increases cancer risk; though just how much radiation is uncertain. The best estimates are based on the Chernobyl nuclear power plant accident and studies of the Japanese atomic bomb survivors who had excess cancer risk after exposure to between 50 and 150 millisieverts.[2] A study last year estimated that over four million Americans receive greater than twenty millisieverts a year from medical imaging.[3]

A study from Columbia University estimated that in three decades, two percent of all cancers may result from radiation derived from CT scans given now.[4] If, as recent studies suggest, thirty percent of all imaging studies are unnecessary, then more than twenty million Americans are needlessly at risk.[5] Since many of these scans are obtained in order to prevent illness, or detect otherwise unrecognized medical conditions, one must wonder how much harm is wrought in the name of prevention.

---

*Dr. Paul Bernstein received his B.A. in 1972 and his M.D. in 1976 from the University of Chicago. In 1982, he became a Fellow of the American College of Cardinals, and from 1988 to 1992 was the Chief of Cardiology at Columbia Hospital. In 1996, he completed his Master's of Liberal Arts also from the University of Chicago. From 2000 to 2003 he was the Chief of Cardiology at St. Luke's Medical Center in Milwaukee, Wisconsin. In 2007 he received his J.D. from Marquette University Law School.

1. Marilynn Marchione, *Overusing Scans Adds to Cancer Risk,* MILWAUKEE J. SENTINEL, June 14, 2010, at 1A.
2. *Id.* at 4A.
3. *Id.*
4. *Id.*
5. *Id.*

INTRODUCTION

Americans cherish their health care. Many believe that health care is a right. Overwhelmingly, Americans believe that more health care is better care and that the more money spent, the better the care. And so any reduction of health care or health care dollars will lead, they believe, to poorer health.

But many doctors know better. In the catheterization laboratory where cardiologists place stents in coronary arteries, they know that better is the enemy of good. Numerous scientific studies have confirmed that more is not better.

- Three anticoagulants are not better than two.[6]
- Intensive blood pressure lowering in diabetics is dangerous.[7]
- Intensive glycemic control is dangerous.[8]
- Two lipid-lowering drugs are not better than a Statin alone.[9]

PHYSICIANS AND SCIENTISTS KNOW THAT MORE MEDICINE AND MORE PROCEDURES AND MORE HEALTHCARE DOLLARS DO NOT NECESSARILY LEAD TO BETTER HEALTH.

In November 2009, the U.S. Preventive Services Task Force (USPSTF) recommended against routine screening mammography in women ages forty to forty-nine and biennial testing thereafter.[10] Some critics seized upon this

---

6. *CLION-T: Triple Antiplatelet Therapy Associated with Improved Platelet Reactivity*, CARDIOLOGY TODAY (Mar. 15, 2010), http://www.cardiologytoday.com/view.aspx?rID=61972.

7. Carl Pepine et al., *Rationale and Design of the International Verapamil SR/Trandolapril Study (INVEST): An Internet-Based Randomized Trial in Coronary Artery Disease Patients with Hypertension*, 32 J. AM. C. CARDIOLOGY 1228, 1233 (1998).

8. Jay S. Skyler et al., *Intensive Glycemic Control and the Prevention of Cardiovascular Events: Implications of the ACCORD, ADVANCE, and VA Diabetes Trials*, 53 J. AM. C. CARDIOLOGY 298, 302 (2009).

9. *See id.* at 303.

10. U.S. Preventive Services Task Force, *Screening for Breast Cancer: U.S. Preventive Services Task Force Recommendation Statement*, 151 ANNALS INTERNAL MED. 716, 716 (2009).

recommendation as an example of the kind of "'rationing' that would allow government bureaucrats to deny insurance coverage of important health procedures."[11] Others made "unsubstantiated attacks on the expertise, motivations, and independence of the scientists and clinical experts on the USPSTF."[12] In fact, both House and Senate bills had required health plans to cover preventive services based on evidence-based reviews by USPSTF. They provided a floor, but no limit, on essential preventive services; and, they proposed comparative effectiveness research and prohibited the use of such research to limit or deny coverage based on cost.[13]

The Obama administration distanced itself from the new recommendations by assuring the public that government insurance programs would cover routine mammograms for woman starting at age forty, regardless of the Task Force recommendations. The administration emphasized that the Task Force recommendations are non-binding on physicians and insurers.[14]

Senator Barbara Mikulski, Democrat of Maryland, championed an amendment that directed Health and Human Services to issue guidelines on which preventive services private insurers must provide free to women.[15] Senator Vitter of Louisiana amended her amendment directing the government to ignore the Task Force recommendations regarding routine mammography in woman under fifty.[16] The Senate approved the measure sixty-one to thirty-nine.[17]

Ultimately, the Patient Protection and Affordable Care Act

---

11. Editorial, *Senate Health Care Follies*, N.Y. TIMES, Dec. 6, 2009, at WK9.

12. Joseph W. Stubbs, *Statement on the Politicization of Evidence-Based Clinical Research*, AM. C. PHYSICIANS (Nov. 24, 2009), http://www.acponline.org /pressroom/pol_ebcr.htm.

13. *Id.*

14. *United States Preventive Services Task Force*, N.Y. TIMES, http://topics.nytimes.com/top/reference/timestopics/organizations/p/preventive_services_task_force/index.html (last updated Nov. 20, 2009).

15. N.Y. TIMES, *supra* note 11.

16. *Id.*

17. *Id.*

of 2009 (Health Care Reform Act) determined that

> current recommendations of the United States Preventive Services Task Force regarding breast cancer screening . . . shall be considered the most current other than those issued in or around November 2009. Nothing in this subsection shall be construed to prohibit a plan or issuer from providing coverage for services in addition to those recommended by [the] United States Preventive Services Task Force.[18]

In response, the American College of Physicians published an opinion paper stating that

> the public is ill-served when assessments of clinical effectiveness are politicized . . . such politicization, if left unchallenged, could lead to efforts to eliminate the Task Force, cut its funding, or result in politically-driven changes so that future evaluations are influenced by political or stakeholder interests – instead of science.[19]

Preventive health services include screening to detect otherwise unrecognized disease, counseling, and preventive medications or treatments. Primary prevention aims to prevent the development of disease not yet manifested, whereas secondary prevention attempts to forestall the progression of disease.

The most powerful interventions have included sanitation and hygiene, soap and water. Vaccinations have eradicated some diseases entirely. Vitamin C in natural or supplemental form prevented scurvy.[20] Colonoscopy, mammography and PSA measurement have been recommended and used for early

---

18. Patient Protection and Affordable Care Act of 2010, § 1001, H.R. 3590, Pub. L. No. 111-148, 124 Stat. 119, 111th Cong. (2010) (to be codified throughout 42 U.S. Code).

19. Donna A. Sweet, Member, Am. C. Physicians Clinical Assessment Efficacy Subcomm., Breast Cancer Screening Recommendations, Address before the House Energy and Commerce Committee, Subcommittee on Health (Dec. 2, 2009), *available at* http://energycommerce.house.gov/Press_111/20091202/sweet_testimony.pdf.

20. *Vitamin C*, THE MERCK MANUAL ONLINE, http://www.merck.com/mmpe/sec01/ch004/ch004j.html?qt=vitamin%20c&alt=sh (last updated Apr. 2007).

detection of cancer.[21] Life style modifications such as weight loss and exercise are thought to impact the development of hypertension, diabetes and heart disease.[22] Vitamin supplements are taken by a large percentage of the population with the belief that vitamins will prevent cancer and heart disease, among other effects. Finally, treatments such as lipid-lowering drugs are known to be effective in primary and secondary prevention of atherosclerotic heart disease.[23]

The "cost" of prevention is not simply dollars. When screening X-ray studies are undertaken on a large scale, harm may result in the form of excess cancer from radiation.[24] Harm also comes in the form of pain and complications of biopsies, and from false-positive results leading to unnecessary testing and surgeries and psychological trauma. All treatments have complications, some lethal, others with profound impact on the quality of life. Most of all, there is harm from "over-diagnosis," defined as treatment of a disease that never would have hurt the patient. We will return to this important concept below.

In the following pages we will examine the U.S. Preventive Services Task Force in detail. Then we will discuss the controversial topics of screening mammography for breast cancer and PSA screening for prostate cancer. Then, we will turn our attention to lifestyle modification and obesity, and finally vitamin supplementation. We will show that more care is not necessarily better care and that assessments of clinical effectiveness cannot be politicized or risk being misguided. And in our rush to provide expensive health care, we should not lose sight of basic health measures such as exercise and diet.

---

21. *Cancer Screening*, THE MERCK MANUAL ONLINE, http://www.merck.com /mmpe/sec11/ch147/ch147d.html?qt=cancer%20screening&alt=sh (last updated Aug. 2008).

22. *Obesity*, THE MERCK MANUAL ONLINE, http://www.merck.com /mmpe/sec01/ch006/ch006a.html?qt=obesity&alt=sh (last updated Oct. 2008).

23. *Dyslipidemia*, THE MERCK MANUAL ONLINE, http://www.merck.com /mmpe/sec12/ch159/ch159b.html?qt=dyslipidemia&alt=sh (last updated Sept. 2008).

24. Marchione, *supra* note 1, at 1A.

THE U.S. PREVENTATIVE SERVICES TASK FORCE

The U.S. Preventative Services Task Force (hereinafter "Task Force") was first convened by the U.S. Public Health Service in 1984. Since 1998, it has been sponsored by the Agency for Healthcare Research and Quality (AHRQ). The panel is composed of leading experts in prevention and primary care. Its members are drawn from the private-sector. The Task Force examines the scientific evidence for the efficacy of clinical preventive services, including preventive medications and treatments, counseling, and screening. Its studies are unbiased, independent, and meticulous. Clinicians and scientists consider its recommendations the "gold standard" of preventive health services.[25]

In short, the mission of the Task Force is to evaluate the benefits of preventive services, recommend which services should be incorporated into medical care and for whom, and develop a research agenda for clinical preventive care.[26]

As a matter of law, AHRQ must convene the Task Force to conduct reviews of scientific evidence on a wide array of clinical preventive services.[27] The Task Force is charged with developing recommendations for health care providers and for providing administrative, research, and technical support.[28]

The Task Force employs explicit criteria to make its recommendations which are intended for use by primary care physicians. Recommendation statements present providers with the evidence, allowing them to make informed decisions.[29]

The Evidence-based Practice Center (EPC) supports the Task Force. The EPC, under contract to the AHRQ, conducts systematic and scientific reviews of the evidence that serve as

25. *About the USPSTF*, U.S. PREVENTATIVE SERVS. TASK FORCE, http://www.uspreventiveservicestaskforce.org/about.htm (last updated Sept. 2010).

26. *Id.*

27. 42 U.S.C. § 299b-4(a)(1) (2010).

28. U.S. PREVENTATIVE SERVS. TASK FORCE, *supra* note 25.

29. *Id.*

the basis for the Task Force recommendations.[30] In turn, the Task Force examines the evidence, weighs the relative benefits and harms of the recommended preventive service, and issues a recommendation. The Task Force, after weighing the evidence, "grades the strength of the evidence, from 'A' (strongly recommends), 'B' (recommends), 'C' (no recommendation for or against), 'D'(recommends against), or 'I'(insufficient evidence to recommend for or against)."[31]

It is important to note the many "partners" to the Task Force. They include primary care academies, Family Physicians (AAFP), Nurse Practitioners (AANP), Pediatrics (AAP), Physician Assistants (AAPA), OB-Gynecologists (ACOG), American College of Physicians (ACP), and others. They also include policy improvement partners such as AARP and the National Committee for Quality Assurance. Federal partners include the Centers for Disease Control and Prevention (CDC), the Centers for Medicare and Medicaid Services (CMS), the U.S. Food and Drug Administration (FDA), the National Institutes of Health (NIH), Veteran's Health Administration (VHA), and others.[32]

The Task Force recommendations buttress prevention in primary care, provide the basis for insurance coverage, and hold physicians and providers accountable for the delivery of effective care.

But, the Task Force does not consider economic costs in making recommendations, though it researches cost effectiveness and reports this information separately. These recommendations are not modified to accommodate concerns about insurance coverage of preventive services, medical-legal liability, or legislation.[33]

---

30. *Id.*

31. *Id.*

32. *Id.*

33. *U.S. Preventive Services Task Force (USPSTF) Procedure Manual – Section 5: Methods for Arriving at a Recommendation,* U.S. PREVENTIVE SERVS. TASK FORCE, http://www.uspreventiveservicestaskforce.org/uspstf08/methods/procmanual5.htm (last updated July 2008).

SCREENING MAMMOGRAPHY NOVEMBER 2009

For woman, the most frequently diagnosed cancer in the United States is breast cancer, which is "second only to lung cancer as a cause of cancer deaths. In 2008, . . . 182,460 cases of invasive cancer and 67,770 cases of in situ breast cancer were diagnosed and 40,480 breast cancer deaths occurred."[34]

During their lifetime, one in eight women will develop breast cancer, the risk increasing with age. The ten-year risk is one in sixty-nine for a woman at age forty, one in forty-two at age fifty, and one in twenty-nine at age sixty.[35] The incidence rate for breast cancer may be decreasing, most likely due to discontinuation of hormone replacement therapy. And, breast cancer mortality has been decreasing. This has been attributed to better treatment and screening mammography.[36]

In 2009, Health and Human Services asked the Task Force to reassess its 2002 recommendations on breast cancer screening. A sixteen-member task force was convened by HHS, which in turn asked the Evidence-Based Practice Center at Oregon Health and Science University for an extensive review of relevant papers on breast cancer screening. The Oregon scientists sent the request out to fifteen outside scientists for additional review, and then returned their analysis back to the panel.[37]

In November 2009, the Task Force updated its 2002 recommendations on mammography, recommending *against* routine screening in women ages forty to forty-nine.[38] The decision to start earlier than age fifty is an individual one, based on patient context and values, it stated.[39] The Task Force made another significant change in long-standing recommendations,

---

34. USPSTF, *supra* note 10, at 720.

35. *Id.*

36. *Id.*

37. Gina Kolata, *Behind Cancer Guidelines, Quest for Data*, N.Y. TIMES, Nov. 23, 2009, at A19.

38. U.S. Preventive Services Task Force, *supra* note 10, at 716.

39. *Id.*

to biennial screening in woman ages fifty to seventy-four.[40] It concluded that evidence is "I" (insufficient) to recommend screening in women over age seventy-five, and "I" (insufficient) for the routine use of magnetic resonance and digital mammography.[41]

The 2002 the Task Force had issued a B recommendation for screening mammography for women forty years of age or older[42] (a "B" grade means that the Task Force recommends the service; there is a high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial).[43] However, it went on to say that "[t]he precise age at which the benefits from screening mammography justify the potential harms is a subjective judgment and should take into account patient preferences."[44] It advised clinicians to tell patients that the balance of benefits and potential harms of mammography improves with increasing age.[45]

The updated 2009 Task Force recommendations were heavily influenced by a new review in which was included a randomized controlled trial. In that study, the number needed to screen to extend one woman's life was 1904 for women aged thirty-nine to forty-nine compared with 1339 for women aged fifty to fifty-nine.[46] Because the risk for breast cancer rises sharply with age, even though the relative risk reduction was nearly the same for these age groups (15% and 14%), the absolute risk reduction for the fifty to fifty-nine year-old women compared with the forty to forty-nine year-old cohort is greater.[47]

The update was also influenced by a technical study that

---

40. *Id.*
41. *Id.*
42. *Id.* at 719.
43. U.S. PREVENTATIVE SERVS. TASK FORCE, *supra* note 25.
44. U.S. Preventive Services Task Force, *supra* note 10, at 719.
45. *Id.*
46. Heidi D. Nelson et al., *Screening for Breast Cancer: An Update for the U.S. Preventive Services Task Force*, 151 ANNALS INTERNAL MED. 727, 730 (2009).
47. *Id.* at 719.

compared mortality rates when screening was started at forty and fifty years of age. This analysis also demonstrated that large numbers of mammograms during the forties led to little gain in life.[48]

Put simply, in terms of NNS (numbers needed to screen), 1904 woman ages thirty-nine to forty-nine must be screened to prevent one death from breast cancer after at least eleven years of observation, compared to 1339 women in their fifties and 377 women in their sixties.[49]

As was stressed above, the Task Force does not consider economic issues when making recommendations.[50] However, cost analysis is another way to get at relative and absolute benefit. Traditionally, this is done by looking at "years of life saved." One such study compared the life expectancy of women who were screened for breast cancer. The authors found that it cost $105,000 per year of life saved for women in their forties compared with $21,000 for women in their fifties or sixties. So, the cost of screening for one year of life saved for women in their forties is five times that of older women. That said, both are within a generally accepted range of cost-effectiveness.[51]

BENEFITS VS. HARMS

The Task Force had to weigh the benefits against the potential harms of screening: Women in their forties have a 10% chance of having a false positive screen.[52] They have a 1% biopsy rate for each mammogram.[53] Yet their risk of cancer is only 1.5 per 1000 women.[54] The anxiety and stress that occurs with a false positive

48. Jeanne S. Mandelblatt et al., *Effects of Mammography Screening Under Different Screening Schedules: Model Estimates of Potential Benefits and Harms*, 151 ANNALS INTERNAL MED. 738, 744 (2009).

49. Nelson, *supra* note 46, at 729-30.

50. *USPSTF Procedure Manual*, *supra* note 33.

51. Peter Salzmann et al., *Cost Effectiveness of Extending Screening Mammography Guidelines to Include Women 40 to 49 Years of Age*, 127 ANNALS INTERNAL MED. 955, 961 (1997).

52. Kolata, *supra* note 37.

53. *Id.*

54. *Id.*

mammogram is common but usually short lived.[55]

Over-diagnosis can occur when screening detects DCIS (ductal carcinoma in-situ), usually in an older woman, who is more likely to die from another cause before the breast cancer would be clinically evident.[56] It also occurs when ductal carcinoma or another early-stage lesion never progresses to invasive cancer.[57] Another form of over-diagnosis is when screening detects a slowly growing cancer that may have never been clinically evident or caused death.[58] Methods for determining over-diagnosis are not well established.[59]

Thus, over-diagnosis occurs in the setting of three kinds of cancer: cancers growing so fast that early diagnosis is futile; cancers growing so slowly they need not be found early to be cured – estimated at one in four; and cancers that can be cured if found early – estimated at 15% of cancers.[60] It is estimated that as many as 30% of cancers found by screening in women in their forties are over-diagnosed.[61]

The surgery, radiation, and chemotherapy that occur without benefit in the setting of over-diagnosis cannot be accurately calculated and must offset whatever benefits come with screening in the young.

The Task Force concluded "that the additional benefit gained by starting screening at age 40 years rather than at age 50 years is small, and that moderate harms from screening remain at any age."[62] Thus, the Task Force gave a "C" recommendation to early screening (a "C" grade is a recommendation against

55. Nelson, *supra* note 46, at 734.

56. Sue Moss, *Overdiagnosis in Randomised Controlled Trials of Breast Cancer Screening*, 7 BREAST CANCER RES. 230, 230 (2005).

57. H. Gilbert Welch et al., *The Sea of Uncertainty Surrounding Ductal Carcinoma In Situ – The Price of Screening Mammography*, 100 J. NAT'L CANCER INST. 228, 228 (2008).

58. *Id.*

59. *Id.*

60. Kolata, *supra* note 37.

61. *Id.*

62. USPSTF, *supra* note 10, at 719.

routine screening of women aged forty to forty-nine).[63]

Assessing risk, the Task Force found that mammograms every two years give the same benefit as annual mammograms; but, confer half the risk of harms.[64]

In response to the storm of controversy its recommendations produced, the Task Force quickly amended them. In December 2009, it dropped its recommendation against routine screening in women ages forty to forty-nine, substituting a more nuanced statement: "The decision to start regular, biennial screening mammography before the age of 50 years should be an individual one and take patient context into account, including the patient's values regarding specific benefits and harms."[65] Thus, despite a careful scientific analysis by independent, private-sector scientists, the Task Force recommendation to delay mammography until age fifty was dropped.[66] Whether this action occurred for political or emotional reasons is left for the reader to decide.

Numerous organizations have issued breast cancer screening recommendations. Given the controversy, it may be useful to consider them. One must keep in mind that these recommendations are for those who are not at increased risk, i.e. who are not genetically at risk.[67]

The American Cancer Society recommended annual mammography at age 40 in a statement issued in 2003.[68] In the days following the November '09 Task Force recommendation that screening mammography not be routinely done before age fifty,[69] the American Cancer Society stated that it "continues to

---

63. *Id.*

64. *Id.* at 718.

65. *Screening for Breast Cancer*, U.S. PREVENTIVE SERVS. TASK FORCE, http://www.uspreventiveservicestaskforce.org/uspstf/uspsbrca.htm (last updated Dec. 2009).

66. *Id.*

67. Gina Kolata, *Panel Urges Mammograms at 50, Not 40*, N.Y. TIMES, Nov. 17, 2009, at A1.

68. Robert A. Smith et al., *American Cancer Society Guidelines for Breast Cancer Screening: Update 2003*, 53 CANCER J. FOR CLINICIANS 141, 142 (2003).

69. U.S. Preventive Services Task Force, *supra* note 10, at 716.

recommend annual screening using mammography and clinical breast examination for all women beginning age 40."[70] The American Cancer Society took issue with the conclusions made by the Task Force, particularly that screening 1904 women in their forties in order to save one life was not worthwhile. Dr. Otis Brawley, the Chief Medical Officer of the American Cancer Society acknowledged that recommendations are based on judgments about the balance of benefits and risks and that reasonable experts can look at the same information and reach different conclusions.[71]

The American Medical Association in 2002,[72] and the National Comprehensive Cancer network in 2009,[73] have made recommendations similar to those of the American Cancer Society. The American Academy of Family Physicians has previously endorsed the Task Force recommendations on breast cancer screening.[74] The American College of Physicians in 2007 recommended that screening mammography decisions in women forty to forty-nine years should be individualized and based on risk of breast cancer; that women should be informed about risks and benefits of screening mammography; and that physicians should base their decisions on benefits and harms, as well as the individual patients preferences and risk factor profile.[75] In 2003, the American College of Obstetrics and Gynecology recommended mammography every one to two years for women aged forty to forty-nine and annually after age

70. Press Release, Am. Cancer Soc'y, American Cancer Society Responds to Changes to USPSTF Mammography Guidelines (Nov. 16, 2009), *available at* http://pressroom.cancer.org/index.php?s=43&item=201.

71. *Id.*

72. *AMA Policies on Breast Cancer*, AM. MED. ASS'N, http://www.ama-assn.org/ama/no-index/about-ama/9060.shtml (last visited Nov. 15, 2010).

73. *See generally* NAT'L COMPREHENSIVE CANCER NETWORK, NCCN CLINICAL PRACTICE GUIDELINES IN ONCOLOGY: BREAST CANCER SCREENING AND DIAGNOSIS V.1.2009 (2009).

74. *A–E: Recommendations for Clinical Preventive Services*, AM. ACAD. FAMILY PHYSICIANS, www.aafp.org/online/en/home/clinical/exam/a-e.html (last visited Nov. 15, 2010).

75. Amir Qaseem et al., *Screening Mammography for Women 40 to 49 Years of Age: A Clinical Practice Guideline from the American College of Physicians*, 146 ANNALS INTERNAL MED. 511, 511-12 (2007).

fifty.[76] In 2009, the World Health Organization recommended mammography every one to two years for women aged fifty to sixty-nine years.[77]

Thus, recommendations for breast cancer screening mammography are mixed, with movement away from routine screening for women aged forty to forty-nine and toward individualizing screening recommendations based on a thorough discussion of benefits and harms and with the individual patient's preferences and risk profile in mind.

SCREENING FOR PROSTATE CANCER

Prostate cancer is the most commonly diagnosed male malignancy in the U.S.[78] In 2008, more than 186,000 cancer cases were predicted to be diagnosed and more than 28,000 are likely to die.[79] After lung cancer, prostate cancer is the leading cause of death from cancer for men.[80]

Prostate cancer must be understood in terms of the following statistics: Even though the risk of developing prostate cancer is high, roughly one in six, the risk of dying from it is only 2.9%. This implies an indolent course for a significant percentage of patients and should inform treatment strategies. In fact, at autopsy, one-third of men under age eighty and two-thirds of older men have evidence of prostate cancer.[81] Thus, for many patients, the cancer grows so slowly that they die from other causes and for most, it is a post-mortem diagnosis.[82]

The PSA (prostate-specific antigen) was initially developed

---

76. American College of Obstetricians and Gynecologists Committee on Practice Bulletins, *ACOG Practice Bulletin: Breast Cancer Screening*, 101 OBSTETRICS & GYNECOLOGY 821, 826 (2003).

77. U.S. Preventive Services Task Force, *supra* note 10, at 722.

78. Eric A. Klein, *Prostate Cancer: Progression, Risk Reduction, and Future Options*, 4 REVS. UROLOGY S1, S1 (Supp. 2002).

79. Ahmedin Jemal et al., *Cancer Statistics, 2008*, 58 CANCER J. FOR CLINICIANS 71, 73 tbl. 1 (2008).

80. *Id.*

81. Victoria J. Dorr et al., *An Evaluation of Prostate- Specific Antigen as a Screening Test for Prostate Cancer*, 153 ARCHIVES INTERNAL MED. 2529, 2529 (1993).

82. *See id.*

to follow the course of prostate cancer. However, it quickly became a screening tool.[83] Because of this screening, the incidence of prostate cancer rose rapidly. Despite what we stressed above, that prostate cancer is usually slow growing, and that patients usually die from other causes, the increase in diagnoses was coupled with an increase in treatments, many fairly aggressive. These included external radiation and radical prostatectomy.[84] Unfortunately, PSA testing was adopted before its benefit was demonstrated from randomized trials. Its use now is more controversial than ever.

In August 2008, the Task Force issued a recommendation statement on screening for prostate cancer.[85] "The USPSTF found convincing evidence that prostate-specific antigen (PSA) screening can detect some cases of prostate cancer."[86] In men under seventy-five years, the Task Force found insufficient "evidence to determine whether treatment for prostate cancer detected by screening improves health outcomes compared with treatment after clinical detection."[87] In men age seventy-five or older the Task Force found "that the incremental benefits of treatment for prostate cancer detected by screening are small to none."[88] Prostate cancer treatments resulting from PSA screening cause "moderate-to-substantial" harms because so many men treated would not have had clinically detected cancer in their lifetimes, the Task Force concluded. These harms include erectile dysfunction in 20% to 70% percent, urinary incontinence in 20% to 50%, bowel problems and death.[89]

The American Cancer Society has urged men to be informed

---

83. Fritz H. Schröder, *Screening and Prostate-Cancer Mortality in Randomized European Study*, 360 NEW ENG. J. MED. 1320, 1321 (2009).

84. Grace L. Lu-Yao & E. Robert Greenberg, *Changes in Prostate Cancer Incidence and Treatment in USA*, 343 LANCET 251, 251 (1994).

85. *See generally* U.S. Preventive Services Task Force, *Screening for Prostate Cancer: U.S. Preventive Services Task Force Recommendation Statement*, 149 ANNALS INTERNAL MED., 185 (2008).

86. *Id.* at 185.

87. *Id.*

88. *Id.*

89. *Id.* at 185-86.

before deciding to have a PSA test.[90] Two recent trials published together on March 26, 2009, in the prestigious New England Journal of Medicine now provide information with which to inform patients. In both studies, participants were randomly assigned to be screened, or not, with PSA. Both groups were then followed for more than a decade while deaths from prostate cancer were counted, so as to learn whether screening makes a difference.[91]

In order to evaluate the impact of PSA screening and digital rectal exams on the course of prostate cancer, The Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial randomly assigned 76,693 men at ten U.S. centers to receive either annual screening or usual care as the control.[92] Subjects in the screening group were offered PSA testing for six years and digital rectal exam for four years.[93] Usual care might include this screening. The endpoints were numbers of all cancers and deaths.

In the screening group, 85% had PSA testing and 86% had digital rectal exams. In the control group, rates of screening with PSA varied from 40% to 52% and rates of digital examination varied from 41% to 46%. There were 116 cancers per 10,000 person-years and 50 deaths in the screening group compared with 95 cancers per 10,000 person-years and 44 deaths in the control group.[94]

After seven to ten years of follow-up, the rate of death from prostate cancer was quite low and did not differ significantly between the two study groups.[95]

The second study began in the 1990s and was also designed to evaluate the benefit of PSA screening. The endpoint was

---

90. *Id.* at 188.

91. Gerald L. Andriole et al., *Mortality Results from a Randomized Prostate-Cancer Screening Trial*, 360 NEW ENG. J. MED. 1310, 1311 (2009); Schröder, *supra* note 83, at 1321.

92. Andriole, *supra* note 91, at 1311, 1313.

93. *Id.* at 1311.

94. *Id.* at 1313-14.

95. *Id.* at 1314.

death from prostate cancer. The European Randomized Study for Screening for Prostate Cancer enrolled 182,000 men ages fifty to seventy-four years. They were randomly assigned to a control without PSA screening and a group that received the PSA on an average of every four years.[96] Those screened had fewer deaths from prostate cancer, but the absolute risk was only 0.71 per 1000 men. After screening 1410 men and treating forty-eight cancers, one death is prevented. For 10,000 men screened over nine years, seven lives are saved from prostate cancer.[97]

The researchers concluded that "PSA . . . screening reduced the rate of death from prostate cancer by 20% but was associated with a high risk of over-diagnosis."[98] Over-diagnosis refers to the fact that forty-eight men were treated for prostate cancer without benefit, "for every man whose death was prevented within a decade after having had a PSA test."[99]

Peter Bach, a physician and epidemiologist at Memorial Sloan-Kettering Cancer Center interpreted the data for the *New York Times*.[100] If a man has a PSA test that is positive, has a biopsy that reveals prostate cancer, and is treated for it, he said,

> [t]here is a one in 50 chance that, in 2019 or later, he will be spared death from a cancer that would otherwise have killed him. And there is a 49 in 50 chance that he will have been treated unnecessarily for a cancer that was never a threat to his life.[101]

Dr. Otis Brawley, the Chief Medical Officer of the American Cancer Society said, "'[t]he [PSA] test is about 50 times more likely to ruin your life than it is to save your life.'"[102] Ironically, he is the very same person who criticized the Task Force for finding that mammography screening 1904 women in their

---

96. Schröder, *supra* note 83, at 1320.

97. *Id.*

98. *Id.*

99. Gina Kolata, *Studies Show Prostate Test Saves Few Lives*, N.Y. TIMES, Mar. 19, 2009, at A1.

100. *Id.*

101. *Id.*

102. Tara Parker-Pope, *Screen or Not? What Those Prostate Studies Mean*, N.Y. TIMES, Mar. 24, 2009, at D5.

forties in order to save one life was not worthwhile.[103]

It might be reasonable to conclude that PSA screening uncovers prostate cancer that is growing too slowly to matter, or too fast to impact its course. And, like screening mammography for women in their forties, this screening test is a personal choice.

The American Cancer Society does not recommend routine PSA screening for most men; rather, the Society urges doctors to discuss pros and cons of the screening on an individual basis. The Cancer Society does not recommend the digital rectal exam because it has not shown benefit.[104]

LIFE STYLE MODIFICATION: OBESITY

"[T]wo thirds of U.S. adults and one fifth of . . . children are obese or overweight."[105] From 1980-2004, obesity prevalence among adults doubled. Thirty-three percent of U.S. adults are overweight (BMI 25-29). Thirty-four percent are obese (BMI greater than or equal to 30).[106] "[Seventeen percent] of U.S. children and adolescents are overweight."[107] Obesity increases risk for many diseases including heart disease, type 2 diabetes (non-insulin requiring), certain cancers, and stroke.[108]

Certain environmental factors are thought to impact the incidence of obesity, "including lack of access to full-service grocery stores" with fruits and vegetables, "increas[ed] costs of healthy foods and . . . lower costs of unhealthy foods, and lack of access to safe places to play and exercise."[109] Reversing the

---

103. Am. Cancer Soc'y, *supra* note 70 and text accompanying note 71.

104. *Can Prostate Cancer be Found Early?*, AM. CANCER SOC'Y, http://www.cancer.org/Cancer/ProstateCancer/DetailedGuide/prostate-cancer-detection (last updated Nov. 22, 2010).

105. Laura Kettel Khan et al., *Recommended Community Strategies and Measurements to Prevent Obesity in the United States*, CTRS. FOR DISEASE CONTROL, http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5807a1.htm (last updated July 14, 2009).

106. *Id.*

107. *Id.*

108. *Id.*

109. *Id.*

obesity epidemic will require "a comprehensive and coordinated approach that uses policy and environmental change to transform communities into places that support . . . [a] healthy lifestyle."[110]

Recently the Center for Disease Control (CDC) "initiated the Common Community Measures for Obesity Prevention Project (the Measures Project)."[111] The objective was to identify and recommend strategies and measurements that communities "can use to plan and monitor environmental and policy-level changes for obesity prevention."[112] The Measures Project developed a number of strategies to reduce the incidence of obesity: promote availability of affordable healthy food and beverages; support healthy food and beverage choices; encourage breastfeeding; encourage physical activity and limit sedentary activity among children and youth; and create safe communities that support physical activity.[113]

VITAMIN D DEFICIENCY AND SUPPLEMENTATION

The scientific method is the primary strategy by which medical researchers verify that treatments are beneficial. First, a hypothesis is used to explain an observation. Then an experiment is devised to prove the hypothesis. In the case of medical research, the preferred experiment is a randomized, prospective study comparing a treatment with a placebo.

A classic example of this process is the recent hormone replacement story. Epidemiologists had "observed" that women develop coronary artery disease a decade after men and almost always after menopause. Scientists "hypothesized" that a fall in hormones was responsible, and the age of hormone replacement began. But the truth was not learned until the hypothesis was tested years later in the Woman's Health Initiative. Published in

110. *Id.*
111. *Id.*
112. *Id.*
113. *Id.*

2002, the WHI-funded study revealed that those post-menopausal women treated with a combination of estrogen and progesterone actually had a higher incidence of heart attack, stroke, and breast cancer than those not taking hormone replacements.[114]

Severe deficiency in vitamin D results in osteomalacia in adults and Rickets in children. But the finding that vitamin D receptors are located in most tissues has led to an understanding that vitamin D plays a role beyond calcium absorption and bone metabolism.[115] More recent epidemiologic studies have demonstrated that vitamin D deficiency is associated with a number of chronic illnesses and that these illnesses occur with greater frequency in the northern latitudes.[116] In this section we will examine these observations, the evidence to support vitamin D deficiency as causative, and the evidence for supplementation. Is vitamin D deficiency in chronic disease an association or a cause? Does vitamin D supplementation reduce the incidence of heart disease, cancers, chronic infections, and immunologic diseases?

Vitamin D is the only vitamin that is synthesized by the human body. Upon exposure to UV radiation in the skin, 7-dehydrocholesterol is converted to Vitamin D_3, accounting for more than eighty percent of vitamin D. Vitamin D_2 is derived from dietary sources such as the oily fish – salmon and herring– and certain plants in which irradiation converts ergosterol to D_2. Milk, cereal, and some other foods in this country are fortified with vitamin D; however, for most individuals, dietary intake

114. Jacques E. Rossouw et al., *Risks and Benefits of Estrogen Plus Progestin in Healthy Postmenopausal Women: Principal Results from the Women's Health Initiative Randomized Controlled Trial*, 288 JAMA 321, 322, 330.

115. Michael F. Holick, *Vitamin D Deficiency*, 357 NEW ENG. J. MED. 266, 266 (2007).

116. William B. Grant, *Ecologic Studies of Solar UV-B Radiation and Cancer Mortality Rates*, *in* RECENT RESULTS IN CANCER RESEARCH: VITAMIN D ANALOGS IN CANCER PREVENTION AND THERAPY 372 (Jörg Reichrath et al. eds., 2003); Armin Zittermann et al., *Putting Cardiovascular Disease and Vitamin D Insufficiency into Perspective*, 94 BRIT. J. NUTRITION 483, 484, 486-87 (2005).

does not come close to providing even the RDA of 400 IU.[117]

Vitamin D is converted to the inactive 25(OH)D in the liver and is hydroxylated to its biologically active form in the kidney, $1,25(OH)_2D$. The active form is bound by vitamin D receptors found not only in intestines and bone but also in most tissues, including breast, colon, and prostate where it regulates cell growth and differentiation.[118]

The inactive metabolite 25(OH)D is used to measure vitamin D levels in the serum. A level of 30 ng per millimeter is defined as "sufficient," based on vitamin D and parathyroid homeostasis. However, optimal levels for non-calcium related regulation are unknown and may be higher.[119] If a serum level of 30 ng is sufficient, then there may be as many as one billion people in the world who are deficient.[120] Those at highest risk for vitamin D deficiency include Hispanics, blacks, the obese, and those with more skin pigment. Individuals with poor dietary intake, the elderly, nursing home residents, and those with chronic liver and kidney disease are also at increased risk.[121]

Recent studies have linked vitamin D and total mortality. Epidemiological studies have demonstrated that mortality from chronic conditions such as cardiovascular disease and cancer rises in the northern latitudes.[122] Survival of certain cancer patients is increased if the diagnosis is made during summertime.[123] Epidemiologists have linked these observations to vitamin D. Their theories are buttressed by recent scientific findings that the active form of vitamin D regulates cell growth

117. Sarah A. Stechschulte et al., *Vitamin D: Bone and Beyond, Rationale and Recommendations for Supplementation*, 122 AM. J. MED. 793, 793-94 (2009).

118. *Id.*

119. Holick, *supra* note 115, at 267.

120. *Id.*

121. Stechshulte et al., *supra* note 117, at 794-95.

122. Philippe Autier & Sara Gandini, *Vitamin D Supplementation and Total Mortality: A Meta-analysis of Randomized Controlled Trials*, 167 ARCHIVES INTERNAL MED. 1730, 1730 (2007).

123. Hyun-Sook Lim et al., *Cancer Survival Is Dependent on Season of Diagnosis and Sunlight Exposure*, 119 INT'L J. CANCER 1530, 1530 (2006).

and differentiation and angiogenesis, factors relevant in cancer formation.[124]

Melamed et al. examined the association between 25(OH)D levels and the risk of mortality in the general population.[125] Vitamin D levels were collected from participants in the Third National Health and Nutrition Examination Survey from 1988 through 1994. The subjects were followed for mortality through 2000. A 25(OH)D deficiency was associated with increasing age, higher BMI, smoking, non-white race/ethnicity, diabetes, and female gender, whereas non-winter season, increased physical activity, and vitamin D supplementation were inversely associated with deficiency. The lowest quartile of vitamin D level was associated with a twenty-six percent increase in all-cause mortality in the general population compared with the highest quartile.[126]

Autier performed a meta-analysis of randomized controlled trials examining the effect of vitamin D supplementation on total mortality.[127] He included eighteen trials that tested vitamin D supplementation on any health condition, in over 57,000 subjects. The average daily dose of vitamin D was 528 IU. He concluded that vitamin D supplementation was associated with a decrease in total mortality, but with a narrow statistical edge.[128] However, these studies did not include mortality as a primary endpoint and the conclusion is questionable.

The Women's Health Initiative was the only randomized controlled study that examined vitamin D and mortality. The trial included 36,000 postmenopausal women who were given calcium and vitamin D or placebo. The hazard ratio for mortality was 0.91 and did not quite achieve statistical significance. In retrospect, the study design may have suffered

---

124. Paloma Ordonez-Moran et al., *Vitamin D and Cancer: An Update of In Vitro and In Vivo Data*, 10 FRONTIERS IN BIOSCIENCE 2723, 2724-26 (2005).

125. *See generally* Michal L. Melamed et al., *25-Hydroxyvitamin D Levels and the Risk of Mortality in the General Population*, 168 ARCHIVES INTERNAL . 1629 (2008).

126. *Id.*

127. Autier & Gandini, *supra* note 122, at 1730.

128. *Id.*

from the relatively low dose of vitamin D used.[129]

The LURIC trial investigated patients scheduled for coronary angiography. After a mean of 7.7 years, all-cause mortality was sixty percent higher in patients from the lowest quartile of vitamin D levels compared with the top quartile.[130]

In a Japanese study following 1232 postmenopausal women, low levels of 25(OH)D levels was independently related to all-cause mortality after an average follow-up of 6.9 years.[131]

In summary, there is data linking vitamin D deficiency with excess mortality; however, there is insufficient evidence that supplementation with vitamin D reduces all-cause mortality.

There is strong epidemiologic evidence connecting vitamin D deficiency to excess cancer mortality, including colon, breast, ovarian, and prostate cancer.[132] Although the basic science providing a hypothetical basis for this relationship is beyond the scope of this paper, there is increasing evidence that vitamin D is a primary regulator of cellular growth and proliferation as well as apoptosis and angiogenesis – processes involved with tumor formation.[133] Several types of cancer cells carry the receptor for calcitriol, the active form of vitamin D. Vitamin D has been shown to inhibit the growth of prostate cancer cells in vitro, although at doses that result in hypercalcemia when used in in vivo animal studies.[134]

In 1936, Peller noted an inverse relationship between the frequency of skin cancer and other cancers and hypothesized

---

129. Andrea Z. LaCroix et al., *Calcium Plus Vitamin D Supplementation and Mortality in Postmenopausal Women: The Women's Health Initiative Calcium-Vitamin D Randomized Controlled Trial*, 64A J. GERONTOLOGY 559, 559, 566 (2009).

130. Harald Dobnig et al., *Independent Association of Low Serum 25-Hydroxyvitamin D and 1,25-Dihydroxyvitamin D Levels with All-Cause and Cardiovascular Mortality*, ARCHIVES INTERNAL MED. 1340, 1340-42 (2008).

131. Tatsuhiko Kuroda et al., *Contributions of 25-Hydroxyvitamin D, Co-morbidities and Bone Mass to Mortality in Japanese Postmenopausal Women*, 44 BONE 168, 168, 170 (2009).

132. Cedric F. Garland et al., *The Role of Vitamin D in Cancer Prevention*, 96 AM. J. PUB. HEALTH 252, 252 (2006).

133. Ordonez-Moran et al., *supra* note 124, at 2724, 2726.

134. Srinivasan Vijayakumar, *Clinical Trials Involving Vitamin D Analogs in Prostate Cancer*, 11 CANCER J. 362, 363-64 (2005).

that sunlight was the root cause.[135] People living further from the equator are at increased risk for a number of cancers.[136] Low levels of vitamin D are associated with a 30% to 50% increase in risk of breast, prostate and colon cancer.[137] Blacks have lower levels of vitamin D than whites and when measured in major Midwest cities, they have rates of colon cancer that are significantly higher than whites.[138] Blacks also have a higher mortality rate than whites for breast cancer.[139]

Vitamin D levels and intake are inversely related to colon cancer risk in numerous epidemiologic studies.[140] In the Women's Health Initiative, subjects with vitamin D levels below 12 ng had a 253 percent increased risk of colon cancer.[141] Recall that in that study, at the doses of vitamin D used, there was no reduction in mortality from colon cancer.[142] In the Nurses Health Study, colon cancer incidence was inversely related to vitamin D levels.[143]

Numerous studies have demonstrated that women who consume more vitamin D or live in sunny areas are at lower risk of breast cancer; and likewise, that woman with lower vitamin D levels are at greater risk for breast cancer.[144] In the Women's Health Initiative discussed above, a nested case-control study was performed in order to examine the influence of vitamin D supplementation on the incidence of breast cancer. There appeared to be no reduction of breast cancer; furthermore, levels

135. *Id.* at 363.

136. Frank L. Apperly, *The Relation of Solar Radiation to Cancer Mortality in North America*, 1 CANCER RES. 191, 194 (1941).

137. *See generally* Edward Giovannucci et al., *Prospective Study of Predictors of Vitamin D Status and Cancer Incidence and Mortality in Men*, 98 J. NAT'L CANCER INST. 451 (2006).

138. Garland, *supra* note 132, at 253.

139. *Id.*

140. *Id.* at 252, 253-54.

141. Holick, *supra* note 115, at 271.

142. LaCroix, *supra* note 129, at 559.

143. Diane Feskanich et al., *Plasma Vitamin D Metabolites and Risk of Colorectal Cancer in Women*, 13 CANCER EPIDEMIOLOGY BIOMARKERS & PREVENTION 1502, 1502 (2004).

144. Garland, *supra* note 132, at 254.

of vitamin D did not correlate with breast cancer risk.[145] Although the authors acknowledge the epidemiologic evidence, they cite numerous negative studies. The authors are quick to point out that a limitation of the study may have been the relatively low dose of vitamin D provided.[146]

In summary, a large body of epidemiologic evidence points to an association between vitamin D deficiency and cancer; but whether this is a mere association or somehow causative is unclear. A body of basic science forms the basis for the hypothesis that the relationship is causative. There is insufficient evidence that supplementation is beneficial.

Cardiovascular disease is more prevalent in northern latitudes where vitamin D levels are lowest and more common in the winter months.[147] Low levels of vitamin D are found in heart failure and stroke patients and are associated with hypertension, diabetes and obesity.[148] In the Third National Health and Nutrition Examination Survey, there was a strong relationship between vitamin D deficiency and self-reported cardiovascular disease.[149]

Vitamin D reduces the sensitivity of the renin-angiotensin neuro-endocrine response, inhibits cell proliferation of the vascular lining, and regulates insulin. It has an anti-inflammatory effect.[150] Calcitriol, the biologically active form of vitamin D exerts its influence on almost all tissues through VDR's or vitamin D receptors, including cardiomyocytes, vascular smooth muscle, and endothelium.[151]

---

145. Rowan T. Chlebowski et al., *Calcium Plus Vitamin D Supplementation and the Risk of Breast Cancer*, 100 J. NAT'L CANCER INST. 1581, 1581 (2008).

146. *Id.* at 1586-88.

147. Zittermann, *supra* note 116, at 486-87.

148. Erin D. Michos & Roger S. Blumenthal, Editorial, *Vitamin D Supplementation and Cardiovascular Disease Risk*, 115 CIRCULATION 827, 827 (2007).

149. Jessica Kendrick et al., *25-Hydroxyvitamin Deficiency Is Independently Associated with Cardiovascular Disease in the Third National Health and Nutrition Examination Survey*, 205 ATHEROSCLEROSIS 255, 257 (2009).

150. Thomas J. Wang et al., *Vitamin D Deficiency and Risk of Cardiovascular Disease*, 117 CIRCULATION 503, 503 (2008).

151. *Id.*

In the Framingham Offspring Study, subjects with low vitamin D levels had a hazards ratio of 1.62 for myocardial infarction, heart failure, and coronary insufficiency.[152] In the Health Professionals Follow-up Study, men with insufficient vitamin D levels had a relative risk of 2.09 for heart attack compared with men with sufficient levels.[153] Recall the LURIC coronary angiography study discussed above in which those in the lowest quartile for vitamin D level had a sixty percent greater mortality than those in the highest quartile.[154]

The Women's Health Initiative showed no benefit on cardiovascular endpoints after vitamin D supplementation in this large prospective randomized study discussed elsewhere.[155] In an editorial in the same journal, Michos speculated that the dose of vitamin D may have been too low, or that only patients at high risk for heart disease would benefit. He reminded the reader of the surprising trials involving antioxidants A, C, and E where observational studies that demonstrated reduced cardiovascular risk were not borne out in the randomized clinical studies.[156]

Vitamin D may regulate blood pressure through the renin-angiotensin system.[157] In the NHANES III trial, the mean blood pressure was found to vary inversely with vitamin D levels. The association was strongest in the elderly.[158] In a meta-analysis Wu used four randomized, controlled trials to examine the relationship between vitamin D supplementation and blood pressure. He found that supplementation may lower systolic blood pressure, but not diastolic pressure.[159]

---

152. *Id.* at 505.

153. Edward Giovannucci et al., *25-Hydroxyvitamin D and Risk of Myocardial Infarction in Men*, 168 ARCHIVES INTERNAL MED. 1174, 1174 (2008)

154. Dobnig et al., *supra* note 130, at 1342-43.

155. Judith Hsia et al., *Calcium/Vitamin D Supplementation and Cardiovascular Events*, 115 CIRCULATION 846, 846 (2007).

156. Michos & Blumenthal, *supra* note 148, at 827-28.

157. Robert Scragg et al., *Serum 25-hydroxyvitamin D, Ethnicity, and Blood Pressure in the Third National Health and Nutritional Examination Survey*, 20 AM. J. HYPERTENSION 713, 713 (2007).

158. *Id.*

159. *See generally* Sheng Hiu Wu et al., *Effects on Vitamin D Supplementation on*

In summary, there is strong epidemiologic evidence for an association between vitamin D and cardiovascular disease; however, there is insufficient evidence for supplementation.

There is epidemiologic evidence and basic science to support a role of vitamin D in multiple sclerosis, diabetes, cognition and depression; however, the story becomes repetitive. We have seen that there is a strong association between vitamin D levels and a number of chronic diseases. There is increasing basic science research to support the hypothesis that vitamin D plays a central regulatory role at the cellular level. However, there is little scientific evidence in the form of randomized controlled trials to support routine supplementation beyond the RDA of 400 IU per day.

As if to place an exclamation point on these conclusions, the prestigious Institute of Medicine released a report on Calcium and Vitamin D, November 30, 2010. The IOM found that "evidence supported a role for . . . [vitamin D and calcium] in bone health but not in other health conditions"; the report went on to state that "emerging evidence [indicates] that too much of these nutrients may be harmful," challenging the concept that "more is better."[160]

We must recall the lessons learned with hormone replacement therapy. We conduct the studies because we don't know the answers.

SUMMARY

More tests and more treatment do not necessarily lead to a better health outcome; increasingly, less care is better care. The public is ill-served when assessments of clinical effectiveness are politicized. Although our society emphasizes screening and drug treatment to prevent disease, other interventions may be more important, including sanitation and efforts to maintain a

Blood Pressure, 103 S. Med. J. 729 (Aug. 2010).

160. COMM. REVIEW DIETARY REFERENCE INTAKES VITAMIN C & CALCIUM, INST. MED., DIETARY REFERENCE INTAKES FOR CALCIUM AND VITAMIN 1 (2011).

clean environment, smoking cessation, and weight loss. Despite the promise of observational studies that subtle vitamin deficiency states are associated with chronic diseases, there is little evidence that vitamin supplementation for these conditions is beneficial and some evidence that supplements are harmful.