

### Yesterday

- Average life expectancy in 1900 was a mere 47 years. People gave little thought to their health until something went wrong. Often it was too little too late and many infants and adults died prematurely.
- People did not know just how much their lifestyles contributed to their wellbeing. Preventive screenings or behavioral interventions were rare and not promoted or reimbursed by healthcare providers or insurers.
- Unrecognized, the twin problems of obesity and type 2 diabetes were stealthily growing.
- There were very large differences in death rates between certain minority groups and those at different levels of education, income and social position. The causes of these disparities in health were unknown.
- Acquired immunodeficiency syndrome (AIDS) emerged. The human immunodeficiency virus (HIV) that causes AIDS was identified and its method of transmission was discovered (sexual intercourse, blood transfusions, needle sharing by drug users). However, no systematic behavioral interventions were available to prevent the spread of infection. In 1993, 80,000 new AIDS cases in the US were reported and 1,800 babies were born infected with HIV.
- By 1960 half of all men smoked and more women were adopting the habit. The death rate from use of tobacco was exploding: from near zero in 1900 to the leading preventable killer of Americans in 2000 (430,000 deaths/year).

### Today

- American life expectancy is 77 years, an astounding increase of 30 years in a single century. While much of this improvement came from changes in living conditions, we now know from epidemiology, demography, economics, sociology, psychology, health services research and other disciplines that 50-80% of the quality of our health and health care is rooted in behavioral, social and cultural factors.
- Many culprits were identified that rob us of additional quality years of life - individual factors (smoking, poor diet, stress, inactivity, hypertension, violence, accidents) and also societal and healthcare system factors (medical errors, gender bias, cultural insensitivity, poverty, lack of insurance and poor access to timely and quality health care).
- About 50% of the premature deaths from chronic diseases and unintended injury come from behaviors that can be changed. Research supported by the National Institutes of Health (NIH) indicates that behavioral and healthcare system interventions are effective in preventing disease, detecting disease at early stages and managing disease once it occurs.
- More and more people are getting screened regularly. Early detection (screening) is now a critical prevention tool, but one that also involves behavior. People have to be motivated to go for regular screening. In 2003, 70% of women age 40 and older had a mammogram to screen for breast cancer within the past two years, quite a high rate. But only about 35% of women without insurance get mammograms on schedule. So there is room for improvement for all screening recommendations, especially for the uninsured and those with lower education or income levels.

- Type 2 diabetes can be prevented or delayed. An unprecedented 21 million Americans have diabetes, and one-third of them do not even know it. The NIH-funded *Diabetes Prevention Program (DPP)* clinical trial studied over 3,000 adults at high risk for developing type 2 diabetes. The oral diabetes drug, metformin, reduced the risk of developing diabetes by 31% but a lifestyle intervention reduced the risk by 58%. This dramatic result was achieved through modest weight loss (5 to 7% of body weight) and 30 minutes of exercise five times per week.
- NIH-supported research on decision-making, drug abuse, and sexual behavior helped reverse and slow the AIDS epidemic. As people changed risky behaviors, the number of new AIDS cases in the US dropped dramatically to 42,000 in 2005. Moreover, today, fewer than 50 babies per year are born infected with HIV. At its core, AIDS is recognized as a behavioral and socio-cultural problem. We now can screen for HIV/AIDS, and have medications that can slow progression or prevent AIDS. But there is still an important behavioral component to these successes: people must volunteer to be screened and must take medication regularly.
- Smoking rates have plummeted. This is one of the single biggest public health success stories of the 20<sup>th</sup> century. In less than 50 years, over 40 million Americans have quit smoking, saving millions of lives and billions of dollars. For the first time ever US cancer deaths have reversed, mostly because so many people stopped smoking. NIH-funded scientists played a role in uncovering links between cigarette smoking, cancer, heart and other diseases. Discoveries informed the development of successful cessation treatments, prevention and policies (tobacco taxes and youth access laws mean fewer adolescents start smoking).
- Health care organizations now reimburse for some forms of prevention - like screening mammography, prostate, colorectal cancer and cholesterol tests. Some insurers will pay for lifestyle interventions such as for losing weight or quitting smoking.
- Some physicians are now trained in behavioral principles - to ask patients about their health habits, to take their patients' cultural values into account, to help people alter their lifestyle, to identify stress, depression, alcohol or drug abuse, and to assist their patients to remember to take their medications and come for follow up visits.

## Tomorrow

- Researchers will discover ways to maintain behavior change over the long term. In addition, new discoveries will improve the effectiveness of behavior change interventions in different settings: the clinic, the community and the health care delivery system. These findings will have a big impact on the health of all Americans.
- Behavioral, social and public health science research about the various pathways and causes of disparities in health and health care will continue to improve, giving us the knowledge we need to reduce and eliminate these disparities.
- There is still a significant lag between new scientific discoveries and their widespread use by healthcare providers and the public. Many factors affect whether individuals and communities will use a given treatment program, including how it is created, how it is presented to people who might want to use it, and whether potential users understand how the program works. NIH has begun a program of research to study how scientific findings are communicated to, and used by, consumers, patients, and health-care professionals, so that results are not merely made available, but are actually used by all.
- Future basic research will focus on understanding how we can reach more people; how our brains make health related decisions; how we can better motivate positive health behaviors and discourage unhealthy ones; how we can get more people to be screened; and how we can initiate and sustain change by engineering our social and physical environments, policies, and economic incentives to support healthy living.
- The grandest challenge of all remains: Can we prevent, pre-empt and personally tailor our best behavioral, biomedical, community-based and population-wide interventions to reach all those that need them in an effective and cost-efficient manner? Understanding and changing behavior, both individually and collectively is the bridge between our biology and our environmental living conditions.
- These challenges will require forging stronger partnerships between the biomedical and the behavioral, social and public health sciences. Adopting a more collaborative interdisciplinary and overarching public health approach will allow us to predict, preempt, personalize and prevent diseases before they cause unnecessary suffering, disability and premature death.