

Lifestyle medicine potential for reversing a world of chronic disease epidemics: from cell to community

The leading causes of mortality and healthcare costs worldwide are chronic diseases, resulting from lifestyle and environmental factors. The economic burden of poor lifestyle choices is no longer sustainable and impossible to ignore. Most chronic diseases are preventable. To treat the causes of these diseases and to be successful in prevention, a strong focus must be placed on lifestyle medicine aspects. Lifestyle Medicine encompasses research, prevention, diagnosis and treatment of dysfunctions caused by a non-physiological lifestyle (lifestyle-related diseases, LRDs) and morbidogenic environments conducive to promoting such lifestyles. The ultimate goal and primary focus of Lifestyle Medicine is to promote healthier lives through salutary environments and healthier lifestyle choices. Treatment of LRDs includes nutritional, exercise, psychological, social, economic and environmental interventions. To successfully do this requires education, training and communication about Lifestyle Medicine at the professional and general public level, while avoiding the trap of 'victim blaming' of individuals whose lifestyles are influenced by circumstances beyond their control.

The current health crisis

The leading causes of mortality worldwide are chronic non-communicable diseases (NCDs); cardiovascular disease (17 million), followed by cancer (7.6 million), respiratory disease (4.2 million) and diabetes (1.3 million) (1). The newly published Global Burden of Disease Study (2010) has systematically highlighted the epidemiological shift in morbidity and mortality resulting from infectious diseases and malnutrition, to NCDs (2). While we have gained approximately 10 years of life expectancy since 1970, we are spending more years living with injury and illness (2). Representing 63% of all deaths, most that die from NCDs are in the prime of their productive years (3).

There is now overwhelming evidence that lifestyle factors such as poor dietary patterns, physical inactivity, tobacco use, excessive alcohol consumption and psychosocial factors, e.g. chronic stress and lack of social support and community, are key proximal factors in the pathogenesis and incidence of NCDs

(4). Lifestyle factors may also be more distal stressors, including economic, political or a high density population (5).

We define lifestyle-related diseases (LRDs) as diseases where the pathophysiology is significantly influenced by lifestyle factors and where a change in these aetiological factors can significantly improve prevention and treatment of the disease.

The world's population has more and more adopted an 'unnatural' environment to which it has not had a chance to adapt physiologically. This leads to numerous biological dysfunctions, probably stemming from a form of low-grade systemic inflammation, which underlies most chronic diseases and risk factors such as hyperlipidaemia and hypertension. The first sign of such an unadapted lifestyle accumulating allostatic load is often increased body weight through a hypercaloric diet and inadequate physical activity (6). It is imperative

that we finally and systematically address the underlying causes of LRDs rather than superficially treating symptoms. Today, one in two Americans and Europeans is either overweight or obese (7). Average body mass indices have on average risen by as much as 2–2.5 kg/m² per decade and is now 30 kg/m² or higher in some countries (8).

As humans, we are designed to move, yet we have never been more sedentary. Physical activity has decreased drastically over the past century, because of economic growth, digitalisation and urbanisation. Over 70% of people in much of the modern industrialised world are not achieving adequate levels of health-promoting physical activity (7). The impact of poor lifestyle is not limited to physical diseases but also increases the risk for mental disorders such as depression and anxiety, which is increasing worldwide (9).

The economic burden of poor lifestyle choices is no longer sustainable and is impossible to ignore. LRDs have been established as a clear threat not only to human health but also to development and economic growth (2). Paradoxically, however, it is the

Lifestyle-related Diseases are now the leading cause of death on the planet and modern medicine needs to address the underlying causes with a new medical speciality, lifestyle medicine

latter that are also causal factors in the development of LRDs (10). At a time when the power of comprehensive lifestyle changes to prevent and reverse chronic diseases is becoming well-documented, the limitations and costs of high-tech medicine are becoming clearer (11–13).

Lifestyle medicine as a clear solution

Building on the existing definition (14), the American College of Lifestyle Medicine, the Australian Lifestyle Medicine Association and the European Society of Lifestyle Medicine define Lifestyle medicine (LM) as:

Lifestyle medicine is a branch of evidence-based medicine in which comprehensive lifestyle changes (including nutrition, physical activity, stress management, social support and environmental exposures) are used to prevent, treat and reverse the progression of chronic diseases by addressing their underlying causes.

Lifestyle medicine interventions include health risk assessment screening, health behaviour change counselling and clinical application of lifestyle modifications. Lifestyle medicine is often prescribed in conjunction with pharmacotherapy and other forms of therapy.

Lifestyle medicine is an inter-disciplinary field of internal medicine, psychosocial and neurosciences, public and environmental health, and biology. Key LM principles include prevention strategies that address lifestyle habits, the underlying biological causes (also more distant causes such as urban design initiatives to make cities and neighborhoods more social and conducive to healthier lifestyles), and the pathophysiology common to LRDs (e.g. low-grade systemic inflammation, dysregulated stress axis, metabolic dysfunctions etc.). As such, LM is an adjunct form of treatment that helps to bridge the best aspects of public health and conventional clinical medicine.

Addressing lifestyle factors has the potential to reduce the burden of chronic disease to the health system, and increase quality-of-life and longevity in the individual. For example, in the European Prospective Investigation into Cancer and Nutrition study of 23,000 people, changes in lifestyle factors could potentially prevent 93% of diabetes, 81% of heart attacks, 50% of strokes and 36% of all cancers (15).

In addition to LRD prevention, comprehensive lifestyle changes can reverse disease progression. When we address these root determinants of our health, we find that our bodies often have a remarkable capacity to begin healing themselves, and much more quickly than had once been thought possible (16–18). Moreover, LM treatments result in significant cost savings

because the regenerative and biological mechanisms that control our health and well-being are so efficient once a physiological lifestyle is adopted (19).

If stressors (such as factors of an unhealthy lifestyle) recur repeatedly or persist over a longer time period, allostatic regulatory stress responses either can prevail or the organism cannot mount an adaptive response (20), culminating in a final common pathway of activated neurotransmitters, neuropeptides, hormones and cytokines which mediate pathophysiology. LRDs can be understood in the framework of driving the body's adaptive capabilities to an unphysiological state (i.e. accumulating allostatic load) (21).

With our improved understanding of the molecular and cellular pathophysiology of LRDs, such as telomere length and epigenetics (22–25) we must now translate the research (aetiologic, including psychology and intervention studies) into physiologically and psychologically healthier ways of living.

Challenges in lifestyle medicine

Patients are often confused by seemingly conflicting health and lifestyle recommendations conveyed through the media. It is vital that health professionals clearly communicate that there is no doubt about the basic constituents of a healthy lifestyle; including daily moderate physical activity, avoidance of tobacco and chronic stress, a diet high in whole plant-based foods and minimising consumption of meat and processed foods. There must be clear communication on the magnitude of benefit(s) possible and the magnitude of lifestyle change necessary to achieve it. These basics can be interpreted in many ways and in a variety of cultural settings, for instance 'Asian' or 'Mediterranean'. Safe, effective, sustainable and evidence-based lifestyle recommendations must be included in the education and training of health professionals and journalists, so they may in turn be communicated to the general public. Influential organisations must be positioned at the intersection of industry and consumers, to co-ordinate the development of real-life, evidence-based health-promoting products and services. Obviously, this presents a challenge as many large commercial organisations (and Governments) have a vested interest in maintaining consumption at a level that is ultimately unhealthy to the individual. Recognising these more 'distal' factors on the causal hierarchy, however, is part of the process of Lifestyle Medicine.

A recent survey found that a high proportion of patients attending primary care with unhealthy lifestyles do not perceive the need to change their habits, and about half the patients reported not having had any discussion on healthy lifestyles with their

family doctors (26). There is an unexplained and no longer bearable time lag between the overwhelming evidence for the harmful health consequences of an unhealthy lifestyle and taking meaningful action at the individual, social and societal level to modify these behaviours and morbidogenic environments. In particular, medical care does not often address lifestyle changes as a primary concern (27,28). Medical practitioners are often unable to cope diagnostically and therapeutically with patients in urgent need of lifestyle changes. The competence and confidence to diagnose and change unhealthy behaviour is lacking (29). We must improve education and training in the treatment and prevention of lifestyle-related diseases (30). There needs to be changes in attitudes and perspectives such that practitioners understand therapeutic lifestyle changes to be the most scientifically valid, clinically effective and achievable treatment possible for most common conditions (LRDs) (31). Practitioners need to be taught how to base even 5 to 10 min on lifestyle medicine principles (30), while we work collectively to establish better delivery mechanisms that reflect the evidence demonstrating more contact time is more effective at producing meaningful lifestyle changes. Perhaps it is also time to look to different forms of health care delivery based on the altered needs of new conditions. Group visits (Shared Medical Appointments) in primary care for example, that include multi-disciplinary input and peer support, may be more appropriate for LRDs than the one-on-one system of consultation that was historically developed to deal with microbiological causes (32). In the modern era of evidence-based medicine, it is substandard practice not to offer the treatment option, or primary recommended therapy, of effective lifestyle medicine services. The provision of evidence-based, safer, more effective and less expensive lifestyle medicine services are the privilege and duty of every practitioner, patient and health care provider on every continent today. It will require the collective efforts of all parties to deliver patients, providers, and economies from the tyranny of the present high-cost, low-effectiveness system of lifestyle symptom care. To deliver effective care in today's world requires treating the lifestyle causes as the foundation of care.

Global action for lifestyle medicine

The United Nations General Assembly held a high-level meeting in 2011 on the prevention and control of non-communicable diseases, calling for commitment and collaboration between and within governments,

the private sector, civil society, the United Nations and international organisations (33). In June 2012, the American Medical Association reached a resolution to "...urge physicians to acquire and apply ... lifestyle medicine, and offer evidence-based lifestyle medicine interventions as the first and primary mode of preventing and, when appropriate, treating chronic disease within clinical medicine" (34). A new systematic review identified a range of population-based strategies aimed at promoting lifestyle change, and called for the development of initiatives and partnerships to translate the evidence into action (35). We note that all of the above should be carried out in the knowledge that individuals are often at the mercy of their broader social, physical and economic environments. The notion of 'victim blaming', as can occur in cases of inequity, must be avoided if LM is to have an effective role in modern healthcare. We must bring together a multi-disciplinary wealth of stakeholders, to: (i) raise awareness of LM among practitioners; (ii) promote and support LM research and clinical LM in the prevention and treatment of LRDs; (iii) offer educational programs and incorporate LM into university curricula and medical and allied health training; and (iv) unite all LM practitioners, researchers, students, educators and policymakers globally.

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References

- 1 World Health Organization W. Global Status Report on Noncommunicable Diseases 2010. 2010.
- 2 Lim SS, Vos T, Flaxman AD et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; **380**(9859): 2224-60.
- 3 Bloom D. The global economic burden of noncommunicable diseases. Program on the global demography of aging, 2012.
- 4 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**(8): 711-8.
- 5 Egger G, Dixon J. Beyond obesity and lifestyle: a review of 21st century chronic disease determinants. *Biomed Res Int* 2014; **2014**: 12.
- 6 Beckie TM. A systematic review of allostatic load, health, and health disparities. *Biol Res Nurs* 2012; **14**(4): 311-46.
- 7 Organization for Economic Co-operation and Development O. Health at a glance, Europe 2010 [January]. <http://www.oecd.org/health/healthpoliciesanddata/healthataglanceeurope2010.htm> (accessed July 2014)
- 8 Finucane MM, Stevens GA, Cowan MJ et al. National, regional, and global trends in body-mass index since 1980: systematic analysis of health examination surveys and epidemiological studies with 960 country-years and 9.1 million participants. *Lancet* 2011; **377**(9765): 557-67.
- 9 Azevedo Da Silva M, Singh-Manoux A, Brunner EJ et al. Bidirectional association between physical activity and symptoms of anxiety and depression: the Whitehall II study. *Eur J Epidemiol* 2012; **27**(7): 537-46.
- 10 Egger G. Obesity, chronic disease, and economic growth: a case for "big picture" prevention. *Adv Prev Med* 2011; **2011**: 149158.
- 11 Stergiopoulos K, Brown DL. Initial coronary stent implantation with medical therapy vs medical therapy alone for stable coronary artery disease: meta-analysis of randomized controlled trials. *Arch Intern Med* 2012; **172**(4): 312-9.
- 12 Moyer VA, Force USPST. Screening for prostate cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 2012; **157**(2): 120-34.
- 13 Ornish D, Carroll P, Cooperberg MR. Prostate cancer screening: think different. *Huffington Post*, 2012.
- 14 Egger G, Binns A, Rossner S. *Lifestyle Medicine*, 2nd edn. Sydney, Australia: McGraw-Hill, 2011.
- 15 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**(15): 1355-62.
- 16 Ornish D, Scherwitz LW, Billings JH et al. Intensive lifestyle changes for reversal of coronary heart disease. *JAMA* 1998; **280**(23): 2001-7.
- 17 Silberman A, Banthia R, Estay IS et al. The effectiveness and efficacy of an intensive cardiac rehabilitation program in 24 sites. *Am J Health Promot* 2010; **24**(4): 260-6.
- 18 Ornish D, Weidner G, Fair WR et al. Intensive lifestyle changes may affect the progression of prostate cancer. *J Urol* 2005; **174**(3): 1065-9; discussion 9-70.
- 19 Ornish D. Avoiding revascularization with lifestyle changes: the multicenter lifestyle demonstration project. *Am J Cardiol* 1998; **82**(10B): 72T-6T.
- 20 Sterling P. Allostasis: a model of predictive regulation. *Physiol Behav* 2012; **106**(1): 5-15.
- 21 McEwen BS. Brain on stress: how the social environment gets under the skin. *Proc Natl Acad Sci USA* 2012; **109**(Suppl 2): 17180-5.
- 22 Ornish D, Lin J, Daubenmier J et al. Increased telomerase activity and comprehensive lifestyle changes: a pilot study. *Lancet Oncol* 2008; **9**(11): 1048-57.
- 23 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 USA* 2008; **105**(24): 8369-74.
- 24 Du M, Prescott J, Kraft P et al. Physical activity, sedentary behavior, and leukocyte telomere length in women. *Am J Epidemiol* 2012; **175**(5): 414-22.
- 25 Blackburn EH, Epel ES. Telomeres and adversity: too toxic to ignore. *Nature* 2012; **490**(7419): 169-71.
- 26 Brotons C, Bulc M, Sammut MR et al. Attitudes toward preventive services and lifestyle: the views of primary care patients in Europe. the EUROPREVIEW patient study. *Fam Pract* 2012; **29**(Suppl 1): i168-76.
- 27 Centers for Disease Control and Prevention. QuickStats: estimated percentage of patients aged >45 years who received exercise counseling from their primary-care physicians, by sex and age group — National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey, United States, 2003-2005. *MMWR* 2007; **56**: 43 (1142).
- 28 Honda K. Factors underlying variation in receipt of physician advice on diet and exercise: applications of the behavioral model of health care utilization. *Am J Health Promot* 2004; **18**(5): 370-7.
- 29 Lawlor DA, Hanratty B. The effect of physical activity advice given in routine primary care consultations: a systematic review. *J Public Health Med* 2001; **23**(3): 219-26.
- 30 Dysinger WS. Lifestyle medicine competencies for primary care physicians. *Virtual Mentor* 2013; **15**(4): 306-10.
- 31 Sagner M, Schulz KH. Lifestyle as medicine. *Dtsch Med Wochenschr* 2012; **137**(34-35): 1706-12.
- 32 Burke RE, O'Grady ET. Group visits hold great potential for improving diabetes care and outcomes, but best practices must be developed. *Health Aff* 2012; **31**(1): 103-9.
- 33 General Assembly of the United Nations U. High-level meeting on noncommunicable diseases, 2010.
- 34 American Medical Association House of Delegates Resolution C. 2012.
- 35 Mozaffarian D, Afshin A, Benowitz NL et al. Population approaches to improve diet, physical activity, and smoking habits: a scientific statement from the American Heart Association. *Circulation* 2012; **126**(12): 1514-63.

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