Minisymposium

Medical practice and community health care in the 21st Century: A time of change

S.J. Genuis*

University of Alberta, Edmonton, Alberta, Canada T6K 4C1

Received 18 October 2007; received in revised form 5 March 2008; accepted 1 April 2008

KEYWORDS
Chronic disease; Clinical practice; Diagnosis; Epigenetics; Molecular medicine; Physician well-being; Public health; Preconception care; Regenerative medicine; Stem cells

Summary The contemporary model of evidence-based medicine has not effectively addressed the ubiquitous public health dilemma of escalating chronic illness, and is being challenged by pervasive dissatisfaction among both patients and caregivers. Several recent reports highlight the disturbing problem of deteriorating morale within the medical community, while unprecedented numbers of discontented patients are turning to assorted unconventional therapies in search of help. Although doctor shortages, overwork, increasing regulation and myriad other challenges add to ever-increasing stress, many medical professionals no longer find medicine to be a rewarding vocation and feel ineffective in their work. Recent research, however, highlights innovative clinical strategies using principles from emerging fields, such as molecular medicine and epigenetics, which offer promising outcomes for many chronically ill patients. In this paper, an investigative and aetiologically based approach to clinical practice is presented; a strategy that has resulted in physical and mental health restoration for many patients. Community health applications incorporating disease prevention and health promotion are also discussed.

'Progress is impossible without change' (George Bernard Shaw).

'It's no surprise physician morale is in the basement' read the headline of a national newspaper. Like numerous other studies, the recent morale survey by the American College of Physician Executives found that doctors are exhausted, fed up and burned out.1 With the stress of work compromising the health and well-being of doctors, frequently resulting in psychiatric problems and family discord, nearly 60% of responding doctors reported that they had seriously considered leaving the practice of medicine. Sadly, many doctors remain pessimistic about prospects for healthcare provision and see no hope 'either in the near or remote future'.1

However, the dissatisfaction and despondency radiating from many doctors contrasts markedly

*Tel.: +1 780 450 3504; fax: +1 780 490 1803. E-mail address: sgenuis@ualberta.ca.

© 2008 The Royal Institute of Public Health. Published by Elsevier Ltd. All rights reserved.
with the unbridled enthusiasm and ardent idealism found in most medical students. Young neophytes continue signing up to learn the necessary facts, therapies and procedures they hope will contribute to saving the world from suffering and disease. What is it that happens to medical trainees when they take off their graduation attire and hang their professional shingle on the door? An editorial in the British Medical Journal asks, 'Why are doctors so unhappy?'

There is no shortage of answers: overwork; medico-legal concerns; doctor shortages; remunerative challenges; never-ending paperwork; pervasive ethical dilemmas; unrealistic expectations; ever-changing clinical directives; increasing government regulation; incessant new technologies; lack of respect; administrative infringement; and the list goes on and on. Although all of these issues add to the total load of frustration facing contemporary doctors, there is another major determinant lurking behind the scenes.

During tête-à-têtes between doctors, particularly those in primary care, physicians often complain about myriad aggravations and problems facing contemporary health providers. Beyond the usual frustrations, however, one recurring issue often emerges. Many doctors relate that the practice of medicine is no longer rewarding; it is neither intellectually challenging nor enjoyable, and many practitioners feel unproductive in their work. Most medical doctors are caring, devoted individuals who sincerely wish to help; however, without knowledge or skills to restore health for numerous chronically ill patients, many doctors end up practising 'cookbook medicine' to meet standard-of-care practice imperatives delineated by clinical practice guidelines.

Empathetic practitioners sometimes find it difficult to listen continually to the desperation and dolorous accounts of innumerable chronically ill persons, some doctors experience frustration and become defensive when dissatisfied patients repetitiously turn to alternative therapies, and many doctors find it hard to maintain motivation when encumbered by a palpable inability to alleviate suffering. Furthermore, for scientifically curious professionals, it is inevitable to question the integrity of a health delivery paradigm which frequently 'flip-flops' on sacrosanct medical tenets. As a result, many doctors no longer experience the joy and personal benefits of practising clinical medicine, and a recent Canadian Medical Association survey of its members confirmed that unprecedented numbers feel discouraged and ineffective in their clinical practice.

Considering the pervasive and deteriorating state of malcontent within the medical profession, introspection and re-evaluation is necessary in order to pursue improved well-being for both doctors and patients.

Following study and consultation to explore updated strategies and innovative techniques to improve patient care, the author found escalating numbers of doctors who have examined and revised their clinical construct to provide patient-centred health care more effectively. In this article, a brief overview of the ubiquitous chronic disease pandemic is followed by analysis of the current medical construct for addressing this public health challenge. After highlighting emerging scientific evidence, a shift in clinical approach is proposed, and the paper concludes with discussion of outcomes and applications.

The chronic disease pandemic

Management of chronic illness now dominates the practice of clinical medicine. Despite unprecedented funds committed to health care and research, contemporary medicine is witnessing the juxtaposition of reduced mortality from acute illness alongside unprecedented rates of chronic degenerative disorders and disability in both the young and the old. A recent paper in the Journal of the American Medical Association discussing childhood illness highlighted 'sobering information on major increases in chronic health conditions', and concluded that 'health and social welfare systems are unprepared for the rapid growth in demands that will arise from these epidemics'. In addition, the World Health Organization released an important document entitled 'Preventing chronic diseases: a vital investment', which outlines the pressing global pandemic of ongoing degenerative illness. Some data highlight the extent of the public health problem.

Recent figures reveal that in the paediatric domain, about one in every six children has a developmental disorder, about 3% of children are born with a major congenital anomaly (not including the significant percentage of fetuses terminated with abnormalities diagnosed in utero), the incidence of childhood cancer increased by 27.1% between 1975 and 2002, and an unprecedented one out of 12 children currently lives with a mental or physical disability. Rates of autism, asthma, diabetes and psychiatric illness continue to abound in children, thus increasing the emotional burden for parents. In the adult realm, chronic illness including cardiovascular disease, arthritic
ailments, diabetes, mental health disorders and rapidly escalating levels of cancer\textsuperscript{15} are dominating medical practice. While chronic care institutions note increased occupancy by younger residents, escalating proportions of patient populations consume medication for ubiquitous psychiatric disorders such as anxiety, panic and depression. In total, chronic disease now accounts for an estimated 72% of the global burden of illness in adults aged 30 years or more.\textsuperscript{16}

Like similar statistics from most developed nations, a report from the Health Statistics Division of the Canadian Government recently found that nearly 4% of Canadian citizens experience inexplicable chronic health conditions, and that 2.4% of the Canadian population suffers from chemical sensitivity\textsuperscript{17}; problems that translate into enormous expenditure for the healthcare system. A 2001 national study by the Canadian Pain Society revealed that 31% of Canadians live with chronic pain, and a recent report by the Public Health Agency of Canada claimed ‘the burden of preventable death and disease has been growing, reducing the quality of life, increasing wait times for healthcare, and challenging the sustainability of the healthcare system’.\textsuperscript{18} Politicians scramble to find solutions as healthcare expenditures continue to escalate, and individuals and groups continue to suffer as the gulf between health as it is and health as it could be continues to widen.

In response, increasing numbers of patients are seeking help from complementary and alternative interventions. Recent studies have reported that, in some locations, the number of visits to alternative health practitioners now exceeds the number of visits to medical doctors. Apologists for the current medical model contend, nonetheless, that contemporary health care must be effective as people are healthier and living longer. However, a detailed statistical analysis of life-expectancy demographics in many developed nations reveals that population increases in longevity are due, in large measure, to two factors. Rather than widespread extended lifespans of good health, it is the tremendous decline in neonatal and early childhood mortality, as well as diminished mortality as a result of modern management of acute illness and trauma that accounts for much of the purported improvement. The mathematical calculation of removing deaths in early life has a profound impact on average longevity figures. Although there are numerous exceptions, many individuals are spending their senior years in chronic care institutions or visiting doctors as they try to cope with degenerative and disabling conditions. Furthermore, with chronic conditions developing at increasingly younger ages, the modern adult in the industrialized world is spending a considerable percentage of his or her life sick. With escalating costs, more sick people and limited resources, how are individual doctors dealing with the onslaught of chronic illness at their doorsteps?

**Symptom-based medicine**

Most medical education focuses on sickness rather than health, most medical journals publish about disease management rather than disease causality,\textsuperscript{19} and most public healthcare systems reimburse doctors to treat disease rather than to prevent or heal it. As a result, in the complex world of contemporary clinical medicine, the fundamental task of ferreting out underlying disease aetiology has been usurped increasingly by efforts to relieve signs and symptoms, with the misguided supposition that symptom relief is equivalent to problem resolution. In the early 21st Century, medical service objectives have increasingly approximated fast-food exchanges: rapid service; brief encounters; and pursuit of immediate satisfaction.

In practicality, the common unfolding algorithm to address illness in the modern evidence-based medical paradigm is the assignment of a ‘diagnosis’ followed by the initiation of therapies to mitigate signs and symptoms, without an adequate exploration of the underlying causes of the diagnosis. Some practitioners forget that a ‘diagnosis’ is simply a useful label given to a particular group of signs and symptoms; a diagnosis does not necessarily identify the source of the ailment nor why the disease process persists. Consider, for example, the contemporary proliferation of diagnoses which include the words ‘disorder’ or ‘syndrome’: motivational deficiency disorder; generalized anxiety disorder; hypo-active sexual desire disorder; irritable bowel syndrome; painful bladder syndrome; restless leg syndrome; and so on. Believing that sick people needed a solution rather than a label, German philosopher Immanuel Kant once commented, ‘Physicians think they are doing something for you by labelling what you have as a disease’.

After tagging a disease, some contemporary practitioners routinely plug in recommended drug protocols taught by industry-sponsored opinion leaders and commercially influenced clinical practice guidelines.\textsuperscript{20} In the fast-food medical construct, prescriptions are quick and easy to dispense, requiring no prolonged investigation into the cause of a medical condition nor an in-depth lifestyle evaluation. Although the judicious use of medication may be invaluable and life-saving in
many situations, the ubiquitous use of pharmaceutical interventions to suppress symptoms is resulting in unexpected and problematic sequelae. The 'have an ill—take this pill' approach to chronic disease often consigns the patient to lifelong affliction and frequently results in prescription-related illness; a 'scandalous pandemic'\textsuperscript{21} which accounts for alarming rates of morbidity and mortality in both adults and children.\textsuperscript{22,23} Furthermore, by quickly relieving symptoms with powerful therapies, the underlying origins may remain unchecked, allowing disease processes to persist insidiously with potential long-term consequences. The result of drug-oriented medicine is not less illness, but an escalating public health problem of rising caseloads of chronically sick patients. In our technologically advanced society, does the symptom-relief construct represent the latest and greatest that science has to offer?

Innovation in science and clinical care

Modern medicine is brilliant at many things, including trauma care, reconstructive surgery, resuscitative techniques, care for acute cardiac events, burn management, intensive care, anaesthesia and palliative therapies. We are fortunate to live in an era where such interventions have the potential to provide necessary care to preserve well-being. However, the common approach to chronic medical conditions requires serious reconsideration. Measured by the grid of recent research published in scientific journals, the ongoing symptom-relief approach to chronic physical and mental health problems appears to ignore and sometimes contradict unfolding science in molecular medicine and epigenetics.

An exploration of recent research, credible journals, case reports and conference proceedings suggests that an evolving construct based on innovative scientific knowledge has the potential to contribute significantly to health and well-being among individual persons and ultimately the public at large. Although detailed study can be complex and technical, understanding basic principles from the emerging fields of epigenetics and molecular medicine is invaluable in pursuing optimal clinical care and community health; a few ideas are presented for consideration.

Concepts from epigenetics and molecular medicine

Rather than existing as an independent collection of isolated organ systems, the human person is an interwoven and interdependent community of specialized cells working and communicating together in harmony. The clinical application of molecular medicine incorporates the fundamental principle that numerous complex actions and interactions occurring at the cellular and molecular level ultimately determine the clinical health of individual patients.\textsuperscript{24} Recent epigenetic research has challenged the common belief in genetic predestination, i.e. the idea that genes and DNA control our destiny. Rather than 'predestinational', genetics appears to primarily have a 'predispositional' impact on phenotypic outcomes.\textsuperscript{25} Epigenetics is the study of factors that regulate genetic expression; the layer of biochemical processes in the cell which turn genes on and off.\textsuperscript{26} Just as a loaded gun needs to be triggered to unload destruction, epigenetic research confirms that disease is often the result of vulnerable genes being triggered by specific determinants. Mounting evidence suggests that without activation, some disease processes will not develop, and removal of the initiating trigger may allow developing illness to abate or subside. What are common determinants that act as triggers?

Although people can 'be sick' or manifest illness in many ways, there are only a limited number of ways of 'becoming sick' or developing illness; a handful of common pathways account for the pathogenesis of much disease and ill health; different conditions with common etiologies. Unfolding evidence in molecular medicine and epigenetic research confirms that cellular nutritional status and adverse exposures acting upon cells are prime factors which regulate genetic and cellular function, and ultimately determine health or disease. It appears that correcting cellular nutritional biochemistry and addressing adverse elements within tissues has enormous potential to preclude the initiation or activation of illness, and to possibly reverse developing disease. A recent study, for example, has shown that provision of required nutrients can induce apoptosis in proliferating cells, thus effectively reducing tumourigenesis and substantially diminishing the development of malignancy.\textsuperscript{27}

Aetiology-based construct

Another tenet of a molecular medicine approach to health care is that multisystem disorders may reflect a single-source aetiology, and thus patients with myriad health problems may not require the care of several different consultants and subspecialists. Each organ system speaks a unique
Clinical relevance

Molecular medicine and epigenetics have direct relevance to clinical practice. The human organism has a profound instinctive ability to heal and protect itself if the body is provided with the fuel it requires and is kept free from adverse elements which impair physiological processes. Incorporating the nature–nurture construct of epigenetic research, sickness is most often the direct or indirect result of cellular nutritional compromise and/or exposure to adverse agents in genetically vulnerable individuals. A recent publication in Science stated that “Chronic illness is the consequence of inherited diversity of the genetic code combined with environmental biochemical influence on the translation of that code into proteins and metabolic outcomes in the cell.” Furthermore, the Centres for Disease Control concluded that ‘virtually all human diseases result from the interaction of genetic susceptibility and modifiable environmental factors.’ Although social factors including socio-economic status and educational level correlate significantly with health outcomes, it is modifiable environmental determinants such as cellular nutritional inadequacy and adverse exposure frequently experienced by the impoverished, uneducated, poorly housed and socially outcast which provide the pathogenetic mechanism to account for much of the disparity.

While genomic make-up cannot yet be transformed, the nurture component of the nature–nurture epigenetic equation is eminently modifiable if abnormalities can be identified and corrected. It is increasingly evident that correction of biochemistry can induce regression of developing disease and on the therapeutic front, scientific research is pursuing epigenetic biochemical interventions dynamically to silence genomic imperfections. Furthermore, in order to devise biosensors to determine patient vulnerability, the National Institutes of Health recently launched a ‘Genes, Environment and Health Initiative’ to develop tools and biomarkers to assess ‘individual exposures to environmental stressors that interact with genetic variation to result in human disease’. Despite promising findings in various studies, however, it is the translation of emerging scientific principles and knowledge into practical tools and strategies that is ultimately needed for clinical medicine and community health initiatives to move forward.

A revised clinical approach

The proposed clinical approach rests on the underlying premise that correction of biochemical problems at the microscopic level can ameliorate health difficulties at the macroscopic level. This approach employs the tried and tested model of patient care: taking a history; performing a physical examination; arranging for appropriate investigations; and implementing interventions. Through these means, underlying aetiologies of health problems are explored, followed by
implementation of interventions aimed at correcting all potential causative determinants.

Using extensive information from the medical literature including assessment of nutritional status, human exposure assessment, and comprehensive history of the patient’s health is taken. Each patient completes an exhaustive questionnaire as part of this process. A physical examination may also reveal important signs and clues which point to the source of illness.

Laboratory investigations to assess biochemical status, determine potential adverse environmental determinants, and delineate potential epigenetic triggers are critical to the process. The objective is to identify metabolic, toxic and molecular irregularities and to uncover what may be accounting for said irregularities. As well as specific tests based on the patient’s history, a detailed assessment of nutrient and biochemical status is undertaken and provides a window into the unique biochemistry of the patient, including objective evidence for any deficiencies or excesses. Utilization of investigations and techniques to assess the total load of adverse influences on cells and tissues, including chemical toxicants, atypical sensitivities, psychological stressors, infectious exposures such as viruses and mould, abnormal metabolic states such as hyperinsulinaemia, and potential injurious factors including electromagnetic radiation, is also essential. Recognizing that each person harbours a distinctive genome with resultant biochemical individuality, consultations with laboratory specialists when necessary may facilitate interpretation of individual data and further understanding of human molecular physiology.

All relevant information is compiled and considered carefully; interventions to correct disordered biochemistry are initiated. While pharmacological therapies endeavour to modify cellular and tissue biochemistry to ameliorate clinical signs and symptoms, restorative strategies endeavour to re-establish normative biochemical function when possible. Restoration of cellular nutrient requirements, required lifestyle and environmental adjustments, and interventions to remove adverse elements from cells and tissues are fundamental for patient recovery. Nutrient use is targeted to deficiency while causative aetiology of disordered nutrient status is explored; indiscriminate nutritional supplementation is avoided as it does not meet the unique demands of the patient’s biochemistry and does not provide a sustained solution. Although the final outcome of this overall approach takes time and requires considerable individual effort and self-discipline, many patients with physical and mental illness (who adhere to recommended interventions) realize health restoration with significant improvement in well-being and quality of life.

It is not uncommon for healthcare professionals to question whether a revised clinical approach, as discussed in this paper, rests within the scope of conventional scientific medicine; a query that behooves an affirmative response. This approach to patient care strives to become the consummate practice of scientific medicine; medicine based on up-to-date credible research as well as extensive evidence and empirical observation. Admittedly, it is not based on drug company research, industry-sponsored clinical practice guidelines, commercially confabulated diagnoses or pharmaceutically driven standard-of-care expectations, it is patient-centred, scientifically based and aetiologically focused medicine. As a result, innovative approaches to medical care which incorporate molecular, cellular and environmental considerations are meeting with notable results for individual patients.

Evolving applications in public health and clinical practice

As well as facilitating the opportunity to optimize health for innumerable patients with chronic disease, molecular-based approaches and research outcomes may be useful when designing public health policy as well as when exploring new possibilities for patients with irreversible tissue damage. The model of preconception care highlights an innovative strategy with enormous potential for improved public health.

Preconception care

The environmental milieu and nutritional status during pregnancy have been recognized increasingly as profound determinants of obstetric outcome as well as subsequent paediatric health and well-being. For example, much paediatric malignancy and some congenital anomalies appear to be the direct result of maternal exposure to toxicants. Furthermore, maternal health and obstetric outcome rely on meeting cellular demands for micronutrients, and various birth defects as well as assorted paediatric disorders appear to result from maternal deficiency of specific nutrients including biotin, vitamin D, vitamin B12, essential fats and folic acid.
In an effort to stem the public health challenge of high rates of congenital disorders, paediatric illness and obstetric complications, preconception care to secure both gestational nutritional requirements and environmental safety is being used by increasing numbers of institutions and has met with remarkable results. For example, while levels of congenital anomalies, growth retardation (IUGR), preterm labour and neonatal intensive care (NICU) admission remain high in the general birth population, recent reports claim that pregnancy outcomes for 327 expectant women previously enrolled in a medically administered preconception care programme included no preterm births, no congenital anomalies, no IUGR and no NICU admissions. This programme emphasized the absolute need for various nutrients in fetal development, and took concerted measures to preclude maternal and fetal toxicant exposure and accumulation. Considering the enormous personal, social, economic and emotional expenditure associated with neonatal and paediatric health conditions, the potential public health benefit of exploring such programmes is evident.

As the preconception care model indicates, an increased focus on preventive medicine and health promotion incorporating research regarding aetiological mechanisms of health and disease needs to be affirmed by individual doctors and the medical profession in general. In addition to the existing emphasis on pathology and disease-management strategies, broad-based discussion on health and well-being is required; ‘health care’ as well as ‘disease care’ is in order. Focused scientific research, widespread medical education, and credible medical literature exploring and addressing aetiological determinants of sustained health and wellness would contribute to a health-based mindset in medical circles. Diffusion of salubrious ideas through the media as well as pro-active health instruction at formative ages would facilitate awareness and adoption of ‘habits of health’ in society at large. In addition, governing authorities need to become apprised of the extent of serious illness and healthcare expenditure that is directly related to preventable factors and, in response, should legislate accordingly.

Pioneering clinical interventions

Ongoing research in cellular and molecular medicine continues to uncover promising possibilities for clinical care. For some patients with alleged irreversible tissue damage, for example, renewed hope is being generated by innovative approaches using new science in cellular research. Recent clinical trials confirm that the emerging area of health care sometimes called ‘regenerative medicine’ may provide unprecedented opportunity for individuals with tissue damage as a result of degenerative disease, vascular events and some types of physical injury. Mobilizing the enormous innate potential of the human body, the re-introduction of autologous adult stem cells originating from specific sources in the patient, including bone marrow, nasal mucosa and inner ear tissue, has facilitated remarkable regenerative success in damaged tissue resulting from various chronic disease states. Using pluripotent or multi-potent cells from postnatal body tissues, amelioration of a rapidly expanding list of clinical conditions, including cardiac damage, multiple sclerosis and Crohn’s disease, has been achieved.

Concluding thoughts

If revised strategies in clinical care are scientifically credible and have the potential to improve individual and public health, two questions arise immediately: (a) why have they not been incorporated into widespread practice?; and (b) do these proposed medical approaches line up with generally accepted prevailing clinical research? Each of these questions will be considered.

Incorporation of scientific innovation

A study of medical history confirms that scientific knowledge translation, i.e. the process by which new research and scientific innovation is disseminated, processed, incorporated and clinically implemented, is a notoriously lethargic and protracted journey that invariably includes several impediments and intransigent opposition. Semmelweis’ life-saving solution to the pandemic of puerperal fever was mocked for decades, Linde’s simple answer to pervasive scurvy-related mortality was ignored for over 40 years, and Warren and Marshall’s recent Nobel Prize for research demonstrating an aetiological link between infection and ulcer disease was only awarded after many years of widespread ridicule and disbelief.

Max Planck, renowned physicist and Nobel Prize winner, noted that ‘a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows
up that is familiar with it’. Vested interests, reluctance to change, apathy, prevailing mindsets, bureaucratic lethargy and intellectual ignorance conspire to impede the process of scientific knowledge translation. History demonstrates that innovative medical approaches are typically challenged by dissenting experts who, often lacking credible scientific argumentation, use their academic positions and credentials to disseminate confusion via disparaging critiques of new evidence and personal attacks against messengers of change. Ongoing diffusion of emerging science, however, particularly to a younger generation unencumbered by outdated knowledge and suboptimal practices, eventually allows for the progressive evolution of clinical medicine.

Contemporary clinical research

The unfolding science in molecular medicine calls into question some of the generally accepted clinical research that is being undertaken and reported in the medical literature under the banner of ‘evidence-based medicine’. The predominant emphasis on drug-oriented randomized controlled trials (RCTs) as the gold standard of clinical research increasingly appears to be a narrow-minded and simplistic approach to both research and illness. Clinical trials and meta-analyses usually assume diagnosis and examine the efficacy of singular interventional therapies to control signs and symptoms, while disregarding biochemical individuality and ignoring several potential confounders that influence illness and shape therapeutic outcomes.

RCTs assume that participants are interchangeable and that broad demographic classifications such as gender provide sufficient basis for defining useful controls—the Human Genome Project, however, has made it clear that genetic variability exists within demographic groups. The expanding field of pharmacogenomics confirms that RCTs which ignore genomic biochemical distinctiveness in drug response and metabolism are inexact. Furthermore, recent study, confirms that accumulated adverse exposures including toxic chemicals may interact with human biochemistry, and thus potentially affect the physiology of many sick people, yet they remain a largely unaccounted for and unrecognized confounding determinant in ongoing medical and public health research.

When assessing the impact of an intervention in clinical trials, individual differences in genomic structure as well as dissimilarity in nutrient status, metabolic condition or accumulated toxicant levels, due to location, lifestyle or dietary practices that may exist in culturally or geographically distinct individuals and groups, may shape response to the intervention significantly. Failure to incorporate significant determinants renders results imprecise. Ultimately, it is difficult to integrate the varied complexities of illness into drug-oriented clinical trials, and it is equally challenging to design objective standards to assess evidence for singularly focused interventions within complex clinical situations.

Reliance on evidence emerging from controlled trials, however, has led to a widespread emphasis on pharmacological therapies that are amenable to RCT testing and which receive research funding from industry. The result has been a plethora of clinical trials primarily concentrating on drug therapies; a construct which distracts medical doctors from pursuing discovery and control of source causes and, taking diagnosis for granted, facilitates a focus on disease management. In response, however, rather than being intimidated by those who use RCT ‘evidence’ to support narrowly focused standards of practice, and by ‘conclusions’ drawn from drug-based research trials, some clinicians are resisting simplistic therapeutic approaches to chronic disease and boldly integrating unfolding scientific evidence about aetiological mechanisms of illness.

Review

By all indications, clinical medicine and the practice of community health care in the 21st Century will involve considerable change. Groundbreaking research in cellular and molecular biology confirms that various interventions at the microscopic level have enormous potential in the macroscopic domain. With use of principles from epigenetic and molecular medicine, encouraging results with numerous chronically ill patients, many of whom had given up on the medical system, have rekindled medical school aspirations for an increasing number of practitioners. Other innovative approaches such as preconception care and regenerative medicine may offer renewed hope for many patients, and exciting prospects for clinical practice currently and in the years to come. At a time when doctors’ morale is low and rates of chronic disease continue to escalate, emerging developments and approaches in the provision of health services have the potential to improve individual and public health, and to make medical practice a rewarding experience for most practitioners once again. The collective conscience and resolve
of the medical community will determine the rate of change from health as it is, to health as it could be.

**Ethical approval**

None declared.

**Funding**

None declared.

**Competing interests**

None declared.

**References**

1. Steiger B. Survey results: doctors say morale is hurting. 2006. Available at: [http://www.findarticles.com/p/articles/mi_m0843/is_6_32/ai_n16910753](http://www.findarticles.com/p/articles/mi_m0843/is_6_32/ai_n16910753) [last accessed 25 January 2007].