

## Chapter Eight

### Conclusion

*The risk as I [see] it, is that there may be a simplistic view of ways that we can reduce health costs through the pursuit of magic bullets, commercially developed, commercially driven, which substitute for tackling the really solid questions about permanent changes to the environment, so that we decrease the risks that people face in their day-to-day living, whether it is through work or lack of work, transport, air quality, water quality, food quality, things of that sort. If we're looking for pills to be a substitute for those desirable changes in society, then I think we are going down the wrong track (Leeder, cited on Radio National 1998a).*

### Introduction

Stephen Leeder's reflections, which were made in the context of discussing medical research and biotechnology in Australia, go to the very core of the issues highlighted throughout this thesis. In summary, we are confronted with two choices in attempting to boost health outcomes. We can continue to conceptualise health in the narrow mechanistic and reductionist way that the dominant biomedical model does, which, beyond its promotion by multinational pharmaceutical firms appears to be increasingly unsustainable, or we can attempt to more substantially address the social, economic and environmental factors often associated with other models of health.

This thesis was borne out of concern that powerful historical, political and economic factors, most notably tied to globalisation, would diminish society's capacity to, or interest in, looking beyond that first option. Tracing the global evolution of human genomics as a field of scientific and economic activity, and how it has manifest itself in the local Australian context, has provided a much clearer perspective of how that choice has been played out in policy. Grounded in the basic science of the Human Genome Project (HGP), human genomics constitutes an extension of the prevailing political and economic order manifest in the biomedical model of health. It is also ideologically and industrially tied to globalisation. These linkages raise questions about the capacity of human genomics to represent the best or most considered option for the future of health.

Human genomics may give rise to many wondrous innovations in health care in the coming decades. However, it is clear that this may be at the expense of more appropriate and ultimately more cost-effective alternatives. The implications of that choice will be canvassed in this final chapter, following on from a consideration of the core research questions.

### **How has the Human Genome Project shaped ways of thinking about health?**

The Human Genome Project (HGP)—the 13-year global mapping and sequencing project contributing to a greater understanding of the genetic processes underlying diseases in humans—shapes thinking about models of health in two distinct ways. First and foremost, it reinforces the dominant biomedical model of health explored at length in chapters two and three. That discussion emphasised that the biomedical model conceptualises health in narrow reductionist and mechanistic, scientific terms, whereby disease is seen to represent a deviation from normal biological functioning and to necessitate care that is individually and technologically focused, cure-oriented, hospital-centred and professionally dominated (Mishler 1981a; Moon 1995; Germov 1998).

The HGP conceptualises health and ill-health in the same terms by narrowly focusing on the deviation from “normal” genetic functioning, which is associated with the new field of genomics. This research trajectory builds on innovations in other areas of scientific activity—most notably molecular biology and biotechnology. Molecular biology seeks to understand biological phenomena through molecular structures (Wheale and McNally, 1988, p.3). In contrast, biotechnology, and particularly modern biotechnology, relates to the deciphering and application of biological knowledge through techniques such as genetic engineering, which focuses on isolating, modifying, multiplying and recombining genes (Ho, 1998, p.19).

The biomedical model is only one of many ways of conceptualising and managing health. The diversity of health care options available throughout history elucidates this situation. Indeed, during the eighteenth century, consumers were far more likely to consult a mountebank or herbalist than a medical practitioner (Porter 1995). And even though by the

1930s and 1940s medical practitioners had achieved political and economic dominance, alternatives to biomedical care still existed. Indeed, “other” traditions have experienced increasing popularity over recent decades (Sharma 1995; Shenfield, et al. 1997). In nations such as Australia, significant numbers of consumers seek alternative health products and practitioners (Cumming, 2000, p.57).

Although the biomedical model is but one approach, it has been a factor in gains in quality of life and in life expectancy, which in turn have enabled biomedicine to acquire considerable prestige and power. One of biomedicine’s most notable achievements was its contribution to the epidemiological transition in the twentieth century, where the development of vaccines for common diseases, such as measles and paralytic poliomyelitis, helped to shift the burden of death and disability from infectious to non-communicable diseases (WHO, 1999, p.13). More generally, continuous technological change has enabled biomedicine to provide consumers with an ever-increasing array of devices and procedures that are capable of alleviating, if not curing, an expanding list of health ailments. For example, an implantable cardioverter-defibrillator, in survivors of cardiac arrest with recurrent ventricular arrhythmias not responding to conventional therapy, can be expected to increase life expectancy by 36-46 months (Fett, 2000, p.12).

There will always be scope for better and more advanced health care. However, the wholesale reinforcement of the biomedical tradition is only desirable and justifiable if, in its current form, it represents the most technically and allocatively efficient utilisation of resources and, as such, is capable of generating the best health outcomes relative to all other approaches or combinations of approaches. This is an important condition, which popular culture is extolled to believe is being met. However, despite biomedicine’s technical prowess and its substantive legacy, evidence strongly suggests that the biomedical model fails this threshold test (Navarro 1986; Doyal 1994; Evans and Stoddart 1994; Moynihan 1998).

There are various reasons why, in its present form, the biomedical model is incapable of generating optimal health outcomes. A primary reason is that biomedicine does not, and never has, adequately accounted for the complex social, economic and environmental influences, which, in combination with biological factors, affect health status and well-

being (Curtis and Taket, 1996, p.28). Its bias is most stark in the competition for health-related resources. While there is evidence showing that improving social and environmental circumstances, especially for the poor, can have a very positive effect on health outcomes (Syme 1996; Bosma et al. 1997), the biomedical industrial complex's interests are exclusively tied to increasing investment in health care, regardless of the opportunity costs. The structural critiques of the biomedical model highlight this bias, which beyond being consistent with the political and economic imperatives of the capitalist system, also perpetuates the social order where those at the bottom disproportionately share the burden of disease (Doyal 1994; Jones 1994).

The origins and development of biomedicine further illuminate the bias for specialist scientific knowledge and technology over all other prospective options. There was nothing inevitable about the dominance of the biomedical model. It only became dominant after biomedicine became linked with the capitalist infrastructure early in the twentieth century. This was achieved after very calculated reforms to medical education and research that promoted investment from conservative industrialists, such as Rockefeller. Following on from the Flexner Report in 1910, which put forward a vision dominated by the commercial opportunities offered by scientific medicine and also by old-fashioned, prejudiced notions of social control, large-scale investment enabled the biomedical model to establish a virtual monopoly in developed nations within a few decades.

It must be recognised though that biomedicine only achieved this position after centuries of “struggling” for market share with other health care traditions. We saw that “struggle” very clearly in the market for birthing services. Following on from the initial efforts during the Enlightenment where, despite poorer outcomes from primitive and unsterilized forceps, some “specialist” male physicians gained territorial rights over birthing from midwives. By the early twentieth century, birthing in developed nations was largely defined in medical terms. That transformation was tied to the rise of obstetrics, and particularly the need for greater teaching and research and to justify costs and prestige (Katz Rothman 1991). Women were officially “educated” to see pregnancy and childbirth as “abnormal” and “dangerous” procedures that necessitated care by doctors and placing trust in medical therapeutics and technological monitoring (Barker 1998). Once fortified by the power of the State and private support, the medical profession systematically defended its “hard

won” interests through processes of subordination, incorporation, limitation and exclusion (Willis 1983). With restrictions placed on midwives’ sphere of activity, midwifery then became virtually non-existent in the US, for example, by the 1960s (Brack 1976).

Beyond the biomedical model’s implicit and explicit biases, it is also increasingly bedevilled by problems associated with rapidly escalating health expenditures and the diminishing effectiveness of more and more health care that threaten its sustainability. The limitations of the model are becoming increasingly evident.

Many drivers of health expenditure exist, which collectively have a self-reinforcing as opposed to self-limiting nature. Over time, this context has created significant pressure on the policy process, where governments in developed nations have been forced to institute reforms aimed at managing or at least containing the growth in health expenditures (OECD 1992, 1994a). Rationing in its various guises has become an economic necessity. Although the decision about the “appropriate” level of health expenditure is ultimately a matter for the political process, without some management, health care expenditure can grow to the point where it erodes the capacity to expend resources in other areas that also positively influence health outcomes. In such circumstances, expanding health care can have a negative effect on health (Evans and Stoddart, 1994, p.55).

Related to strong growth in health care expenditures in developed nations is evidence pointing to the diminishing returns associated with that increasing investment. While there is not a clear relationship between increased health expenditure and improved health outcomes (Ross et al. 1999), modern medicine is proving ineffective against a growing number of cancers, viral illnesses and chronic conditions (Saltman, 1998, p.222). Antibiotic resistance, created by the evolution of dangerous new microorganisms, exemplifies this situation and is decreasing the efficacy of health care. Consequently, many “old” infectious diseases, such as tuberculosis and cholera are experiencing a resurgence (Ho, 1998, p.12), which is aided by a pharmaceutical research and development environment where increasing costs have led to fewer new drugs. With between US\$300-500 million and ten years required to successfully research, develop and test a single new biotechnology drug (US Senate, 1994, p.29), relying almost exclusively on medical care is highly likely to be allocatively inefficient.

Diminishing returns from the biomedical model points to a need to broaden the model's base to more meaningfully incorporate elements from other or alternate traditions that reflect the multidimensional nature of health. While often stereotyped or stigmatised as a fringe movement, the popularity of other traditions has grown to the point where the term "alternative" no longer realistically applies (Moynihan, 1998, p.249). Such traditions reject the simplistic reductionism inherent within the biomedical model, and instead endorse a holistic approach that incorporates environmental, economic and social factors related to improved living standards and, by association, better health outcomes.

In addition to reinforcing the dominant but highly problematic biomedical model, the HGP also regenerates it. Concepts of health and illness are re-cast on a new and increasingly reductionistic level in a way that emphasises the role of genes in an extremely broad category of conditions. This focus has given rise to notions of a genetic model of normality, whereby processes of diagnosis, treatment and prevention can offer people an individual and natural right to "normal" health (Fox Keller, 1992, pp.294-295). Personalised gene therapy—portrayed as the biomedical model's inevitable outcome—epitomises this approach (Summers and Cooney, 1994, p.42). It involves supplanting "defective" genes with "normal" counterparts to cure hereditary diseases such as cystic fibrosis (Gorman, 1995, p.96).

Although, as mentioned earlier, the HGP may bring significant innovations, such as for diseases related to the action of a single gene, the manner in which the project shapes broader definitions and measures of health brings with it significant perils and opportunity costs.

The dangers inherent in such a trajectory of research and development have been played out in the dark history of eugenics, where genetic knowledge became a means of rationalising discriminatory ideas associated with social control. These ideas evolved in the 1920s into an interest, first espoused by the Rockefeller Foundation, in approaching social problems through scientific means consistent with the political and economic interests of elites. These same dangers exist today. While more subtle, there is considerable interest in using genetic insights to help understand and intervene in the realm of social behaviour and to withdraw state-sanctioned social supports in the name of what some are want to call

“biological realism” (Rose, 1998, p.20). The former Bush Administration’s “Violence Initiative”, which sought to identify low serotonin levels as the source of inner-city social problems, was one of the more recent initiatives in this area. The dangers precipitated by the wholesale tendency towards genetic diagnoses are also evident at the individual level. The burgeoning interest in genetic enhancement, evident in the mass marketing and take-up of human growth hormone for children who are not clinically growth hormone deficient, and who are thereby exposed to the risk of contracting leukaemia, highlights the momentous social force of the emerging genetic model of health.

This shaping of health at both the individual and population levels is a serious public policy issue. Despite the evidence about the growing unsustainability of the biomedical model in its present form, this trajectory of research and development and its broad-ranging appeal invariably improves the capacity to allocate more and more resources into the service of the global health care industry. This potential is clearly illustrated by the situation where “genetic disease” applies to “not only genetic disorders that are thought of as diseases but also genetic abnormalities associated with no known disorder as well as disorders that may be neither genetic nor diseases” (Fox Keller, 1992, p.292). The pressure on governments to fund genetic solutions to health problems, real or commercially-inspired, will be immense. Accordingly, it will be much more difficult politically to shift any resources, in the interests of allocative efficiency, away from health care to the range of social, economic and environmental factors that are in accordance with moving towards an integrated model of health.

### **What role has globalisation played in this process?**

Globalisation, which is a complex concept, has played a leading role in reinforcing and renewing the dominance of the biomedical model of health through advancing human genomics. The political economy approach adopted here has explored globalisation as an historical process constituted by distinct institutional and ideological relations (McMichael, 1996a, p.26). This approach has illuminated the structural linkages between globalisation and the HGP and makes it clear that without the impetus of economic globalisation, genomic research would not enjoy the high level of popular endorsement that it receives today. Indeed, the political economy approach employed has provided a strong theoretical

base from which to “map” the rise and continued rise of human genomics. Nonetheless, there are limitations in relying on such a macro approach. Key among these is the inability to track for other specific factors in the rise of human genomics, and as such, the capacity to “gloss over” some elements that might be more significant than what they appear and that might have led to different conclusions.

Economic globalisation evolved out of the period of large-scale restructuring after World War II known as the development project. This period, which lasted from the late 1940s to the late 1970s, reflected widespread interest in understanding processes of economic transformation and in improving national welfare (Jenkins, 1992, p.131). This sentiment found expression in Fordist political economy, which had two defining features. The first was that governments were consigned the key role in economic management and in overcoming structural impediments to growth. Buoyed by the spirit of values such as equality, collective welfare and material security, which were popularised by Keynesian economics, the state intervened in the national economy to ensure that the dynamics of production and consumption were somewhat stable (Hirsch, 1991, p.31). That philosophy laid the basis of the modern welfare state. However, the reliance on demand management or consumerism was also possible due to compromises between the working and capitalist classes which, following on from the increases in productivity through Henry Ford’s mass production system, allowed for high wages (Teeple, 1995, p.62).

The second element was a stable international monetary system, which was perceived as necessary in preventing economic and political disorder (George and Sabelli, 1994, p.25). This led to the institution of the famous Bretton Woods institutions in 1944, including the IMF, the World Bank and GATT, which were generally intended to maintain currency exchange, stabilise exchange rates, make loans to encourage development and reduce barriers to trade.

These elements spawned a period of accelerated economic development and stability known as “the long boom”, which lasted from the post World War II period till the late 1970s. Although there were some problems associated with a growing wealth gap between First and Third World economies and uneven development within the Third World (McMichael, 1996b, p.80), the functionality of this state-sanctioned and “rigid” framework

did not endure (Harvey, 1992, p.142). That situation was indicative of the rise of new economic dynamics from within the old development paradigm.

Those new dynamics related to the steady emergence of the transnational elements of the global economy, which began with the institution and spread of global production systems from the 1950s (McMichael, 1996b, pp.87-92; Lipsey, 2001, p.25). Such processes allowed for the rapid expansion of foreign direct investment and the transnationalisation of capital circuits to the extent that capital, which was unconnected to and independent of the trade in goods and services, became an organising principle by the late 1970s. For example, by the 1980s, the scale of annual trade of world financial markets was at least 25 times more than that of the trade in goods and services (Review of the Month, 1992b, p.6). Through this process, capital effectively outgrew the political framework or sovereignty of the nation-state and was redefined in terms of the growing numbers of MNCs and associated transnational practices at the supranational level (Teepie, 1995, pp.68-69). The legitimacy of nation building under Fordist political economy was thus severely eroded. Perhaps more significantly though, the changes signified the demise of the nationally defined capitalist class, which was replaced by the rise of an international capitalist class that broadly perceived their national interests to be served by identifying with the well-being of the global economy rather than with the nation state per se (Sklair, 1995, p.44).

This evolution in the base of economic power contrasted radically the globalisation project from its antecedent, the development project. Through the fundamental recasting of debt as a liability during the early 1980s, developed nations thereby began instituting global economic management (with varying degrees of enthusiasm) to help engender renewed capitalist accumulation and thereby avoid economic marginalisation (McMichael, 1996a, p.34). The distinguishing features of this form of management are an adherence to neo-liberalism and the pursuit of a new or post-Fordist techno-economic paradigm.

Neo-liberalism (or economic rationalism as it is known in Australia) is associated with the belief that the Keynesian state undermines the stability and wealth generating capacities of the capitalist system. The core concern is that an interventionist state promotes a pattern of government spending that is allocatively inefficient, and which entrenches organised interests and overrides individual freedoms (Self, 1996, pp.224-225). For adherents, the

alternative is simple. Let the free market decide. This notion has led many governments throughout the developed world to vigorously support the wholesale privatisation of public enterprises and the reduction of welfare and related social expenditures in a bid to improve economic competitiveness. Although this process has aggravated and exacerbated inequalities within many developed nations (Bradshaw and Chen 1996, p.16; Henry, 2002, p.6), neo-liberal thinking has also extended to much of the Third World, which has been forced to adopt it by richer nations under the guise of structural adjustment.

The great hope is that the neo-liberal agenda will help regenerate cycles of economic growth. Considerable emphasis, especially within developed economies, is placed on promoting processes of “flexible accumulation” that rely on new productive sectors and new markets that rely on a much greater use of innovation (Harvey, 1992, p.147). At the centre of this vision are techniques of “flexible specialisation”, such as information, communication and molecular-based technologies, which are known as post-Fordist. These techniques contrast against the reliance on economies of scale facilitated by the Fordist system by offering economies of scope since the same techniques are capable of producing a virtually unlimited variety of products (Bonefeld, 1991, p.54).

The commercial scope of post-Fordist techniques led governments throughout the industrialised world to identify such industries as technologies of globalisation (Hindmarsh 1998b) and to enact policies to attract and support related local development. Despite the difficulties in “picking winners”, since the 1980s this industry and science policy context has given considerable emphasis to research that is of a short term and specific nature and which conforms to a competitive model of technological development. In the process though, this emphasis has radically transformed the nature of academic research. Academic scientists have been increasingly forced to abandon the basic or curiosity-driven research that creates the rich knowledge basis that sustains technological change, and to instead pursue applied projects in the hope of developing new proprietary knowledge (Salomon, 1985, pp.79-80; Dickson, 1988, p.60; Ziman, 1994, p.40). While this model of research may bring results in the short-term since it is grounded in a history of basic research, without renewed support for basic research the prospects for the future are not good, with society drawing its technological knowledge from a diminishing base.

The ideological and industrial priorities tied to economic globalisation thus tangibly shape ways of defining and managing health. In short, these priorities give emphasis to health care models that involve the continued investment in individualistic and interventionist modes of care through molecular biology. Furthermore, this entrenching of the dominant political economy in health care further marginalises alternate or community-based approaches that highlight the need for greater attention to the social, environmental and economic domains.

We see the links between economic globalisation, molecular biology and the HGP very clearly in the manner in which the science was enthusiastically supported by prominent elites and indeed in the way it evolved in tandem with (and helped give shape to) the emerging global economy. This situation draws on the social dimensions of science, and particularly the notion that science is ultimately a social enterprise embodying a range of possibilities that are seized upon by particular people, for particular purposes, according to particular notions of social destiny (Noble, 1977, p.xxii).

Historically, the most significant interests to embrace the potential of genetic conceptualisations of health were the Rockefeller Foundation and the pharmaceutical industry. The Rockefeller Foundation was central to the development of molecular biology, providing generous patronage to the science from early in the twentieth century. This followed on from the extensive patronage given to medical science, education and research, which was crucial in establishing the dominance of the biomedical model. As was the case with medical education and research, the policy that supported the origins of molecular biology was instilled through technocratic management. Under the guidance of Warren Weaver, the Rockefeller Institute of Medical Research spent approximately US\$90 million on experimental and molecular biology from the early-1930s to the late-1950s (Abir-Am, 1982, p.345). The sheer scale of this funding guaranteed the spread of such research, which reflected Weaver's preoccupation with understanding the physical, chemical and mathematical techniques of life. This was part of a vision whereby molecular biology would facilitate the development of deterministic models and thereby establish a scientific basis for social reform—consistent with the Foundation's broader "Science of Man" agenda (Fuerst, 1982, p.254; Abir-Am, 1982, p.342). However, the capacity of the Rockefeller Foundation to support this vision extended far beyond the walls of the

Rockefeller Institute, with Foundation funding proving an important factor in the discovery of the double helical structure of DNA by Watson and Crick in 1953.

The pharmaceutical industry, dominated by large multinational corporations, became a key force in the establishment and development of molecular industry from the early-1980s when a series of legal precedents controversially conferred proprietary rights of ownership to new life forms created through genetic engineering techniques. These precedents served as a powerful triggering mechanism in the evolution of modern biotechnology and also enabled the modern pharmaceutical industry to exert a strong influence on the emerging globalisation context.

Biotechnology then became an important feature in the long-term research and development strategy of pharmaceutical firms after the economic downturn of the late-1970s, by which time the pharmaceutical industry was displaying characteristics indicative of an increasingly saturated market. After a long period of market expansion, reduced numbers of new drug applications and new chemical entities and slower growth in sales confronted the industry (von Grebmer, 1985, pp.220, 241). Without significant innovation, fewer new drugs and minimal advancements in health care would follow. Pharmaceutical firms thereby implemented comprehensive biotechnology strategies starting in the 1980s, involving in-house R&D programs and a series of strategic alliances and mergers and acquisitions to help position themselves at the frontline in the emerging genetic revolution.

However, for all its promise, the relatively small incidence of genetic disease, especially in adult populations, seemed to diminish the commercial prospects for a market-wide genetic revolution in health care. Additionally, the process of developing products proved very slow and extremely costly. To help counter these problems, the pharmaceutical industry, especially that based in the United States, controversially cultivated a much larger market through extending the concept of genetic diseases to include those not conforming to a particular genetic “norm”. The industry also lobbied the US Congress for a public-funded, “big science” project to map the complement of human genes and thereby expedite the R&D process. Through these processes, the pharmaceutical industry provided the political and economic impetus for the massive public investment in genomic research, first in the United States, then, in other parts of the globe.

**What has this meant for smaller nations such as Australia?**

In responding to globalisation and the impetus of human genomic research, Australia essentially had three choices: to support or underwrite the development of human genomics in keeping with larger industrialised nations; to ignore human genomics; or to adopt some judicious mix between the two. Driven by fear of economic marginalisation and cultural irrelevance, Australia has fallen in step behind other OECD nations and elected to underwrite genomic research and development.

This choice most notably involved a transformation in industry and science policy frameworks giving increased funding and other institutional support to biotechnology and genomics since the mid-1990s. However, as noted earlier, the study has not systematically explored this transformation from all perspectives. Most notably, the links to the local agro-biotechnological base have not been comprehensively explored here and further research could expand on the synergies between these areas. Similarly, further research could examine the role played by multinational corporations in this process, and Australia's response to human genomics could be more extensively compared with that of other like nations, such as Canada. Indeed, the experiences of and measures taken by smaller countries may differ significantly. Such insights would contribute to a more holistic perspective on the efforts to support medical biotechnology and human genomics and the various opportunity costs along the way. However, in keeping with related assessments concerning the local agro-biotechnological base (Hindmarsh 1998b), Australia's response has involved both convergences and variations from the experiences of more powerful industrial nations.

Australia's adoption of neo-liberalism under the guise of economic rationalism—a key plank in the reductionist GM health model—followed the lead of other English-speaking industrial economies. A considerable impetus to class inequality has been a common although undesirable outcome. Between the mid-1970s and mid-1990s, inequality in Australian society increased significantly. In terms of income-based poverty, in the mid-1970s, some 20.6 per cent of Australian families and single people were living below or near the poverty line (Commission of Inquiry into Poverty 1975). By the late 1990s, this figure had grown to 30.4 per cent (Fincher and Nieuwenhuysen 1998). This, in turn, has

provoked significant disenfranchisement since the mid-1990s and a social backlash, which has seen Australia's political leaders turn their attention to the conservative ground (Shanahan 2000). For all Australia's historical, economic and social advantages, the neo-liberal experience has led the nation's political debate to be slowly infected by dispassionate and harsh attitudes. Increasingly, those at the very bottom of the social and health status order, such as the unemployed and immigrants, are blamed for the misery of their own circumstances.

The key divergence from international experience with economic globalisation was that associated with the industry and science policy environments that foster techno-economic change. That divergence was a largely a product of Australia's historical and social circumstances, whereby the extent of the nation's wealth generated through rural and mineral industries had not prior to the 1980s necessitated sophisticated nor interventionist industry and science policy frameworks (Bell and Head 1994).

The surge of economic globalisation changed this context, albeit rather slowly. While Australia's politicians were somewhat reticent to take on the role of promoting technological advantage by "picking winners", the degree of inconsistency between Australia's industry and science policy settings and those of compatible nations was seen to expose the country to significant economic risks. As politicians and policy-makers alike became aware throughout the 1990s of the escalating pace of technological change, new notions of competitiveness and the scope for marginalisation, they sought to reorient and shift policy criteria to support new strategic industries. This process led Australia to gradually endorse industrial policy processes that were more in keeping with the experience of larger economies and that would give the GM model of health priority over other alternatives at the local level. From a position where genomic development was hamstrung by what Balmer (1994, p.16) identified as "implicit theories" and broader policies of "benign neglect", this industrial impetus enabled Australia's genomic interests to win tacit support for a dedicated facility in the mid-1990s and then more substantial backing in terms of research funding, facilities and enabling agencies from the late 1990s.

Other advanced nations have provided more consistent and generous support to human genomics and the evolving global techno-economic paradigm. Nonetheless, Australia's

recent and largest policy efforts to underwrite the new field, such as the decisions coming out of the Wills Review and the inclusion of biotechnology and genomics as priority areas by the Australian Research Council, have illuminated how far the Australian Government has progressed in its support. To secure these respective policies, key decisions were made by way of “special” or unquestioning processes not open to the usual scrutiny. The Government was not interested in taking advice that might diminish its capacity to be seen to be unambiguously endorsing GM health and everything it stands for.

Responding to the ideological and industrial dictates of globalisation in this manner has enabled Australia’s biomedical interests to reinforce their dominance, which has been challenged by the increasing popularity of complementary health care with consumers, especially from the 1990s, and also by the broader technocratic need for control over health expenditures. This relates to the fact that the health care market the world over is still a contested domain. Medical interests played a key role in advancing the change in industry and science policy frameworks to support biotechnology and genomics from the commissioning of the Wills Review in 1998. In the process, medical interests have ensured that advocates of a broader model of health (including other health care practitioners) will in future years have to contend with another and an increasingly powerful area of biomedicine.

### **Implications and reflections**

The local and global ascendancy of the GM model of health, replete with its underlying scientific and social biases and thinly veiled commercial core, diminishes the likelihood of the biomedical model being seriously challenged in the foreseeable future. Aided by the prospect of an almost infinite range of powerful new diagnostics and therapies, notions of health will thereby continue to be overwhelmingly defined in terms of access to technologically-sophisticated, professionally-dominated, and individually-focused forms of care. This prevailing conceptualisation will mean that health inequalities, both within and between societies, will in all likelihood continue to grow.

The genomic revolution in health will exacerbate the problems of escalating costs and diminishing returns that characterise health care systems in industrialised countries. The

expense of genomic innovations, combined with a general public highly receptive to genetic solutions to either real or commercially-inspired health problems, will lead to very difficult policy choices with far-reaching repercussions. Among the most apparent is whether societies, such as Australia's, are willing or able to provide equal access to those new medical biotechnologies that are proven safe, efficacious and cost-effective and, in light of social and economic pressures associated with an ageing population, to whom and in what circumstances. As long as governments want health expenditures to be predictable, restricted publicly-subsidised access is highly probable. Conversely, with governments also increasingly looking to private health insurance arrangements to provide access to "supplemental" and "discretionary" forms of care, which might include many of the future products of biotechnology and genomics, the average consumer may have quite limited access to GM health options. Tracking these policy processes, and the appropriateness of evaluation frameworks, will be important sources of future research.

To the extent that governments and private insurers provide access to such products and support the development of the associated industries, the biomedical model will become increasingly unsustainable economically. However, without some broadening in the basis of biomedicine, consumers will continue to seek other forms of health care. And as dissatisfaction with biomedicine increases, so too should political and economic support for alternative models. In this sense, a broader conceptualisation of health, involving biomedicine, is inevitable. In the meantime though, the challenge will be to ensure that competition for health care resources does not erode societies' investments in the social, cultural, environmental and economic factors that protect living standards and, by association, health status.