

# **The Future is Now: Genetic Promises and Speculative Finance**

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After a rough draft of a human genome was announced in the year 2000, “it was no longer possible to open a newspaper without encountering some new biomedical or biotechnological discovery directly related to genetic research” (Franklin 2001: 336). Today, however, only an occasional mass media report highlights the latest genetic promise, while news websites have been dominated by stories related to the aftermath of the 2007-2008 Global Financial Crisis. This chapter explores the parallels, connections and disjunctures between the worlds of biotechnology research and development (R&D) and of high finance because “one can understand emergent biotechnologies such as genomics only by simultaneously analyzing the market frameworks within which they emerge” (Sunder Rajan 2006: 33).

## **THE PROMISSORY FUTURE OF BIOTECHNOLOGY**

*Emerging bioeconomies depend on a promissory future economic value and potential  
rather than present use*  
(Martin, Brown, Turner 2008:128)

*“Genomics . . . is promissory through and through”*  
(Fortun 2008:11)

“The future” is key in biotech R&D. Since the 1980s, biotech scientists and their supporters have promoted visions of the future in which disease, hunger, pollution, biodiversity loss and industrial waste will all have been vanquished by new biotechnology products and processes.

It is predicted that in future an individual’s genome – the particular sequences of DNA molecules in their body – would be routinely “decoded” from a biological sample and the resulting information stored on electronic medical records. When the patient goes to a doctor with certain symptoms, new pharmaceutical drugs would be prescribed, tailored to her individual genome and illness. Plants such as corn, tobacco and rice and/or milk-producing animals could be genetically engineered with human proteins to “grow” some of these drugs or to express them in their milk. Analysis of the information before symptoms appear could assess the probability that she might succumb to a disease in the future. A diagnostic test could encourage her to change her lifestyle or to take other new pharmaceutical drugs that claim to prevent this particular future from occurring. By using the public health concept and language of prevention and by suggesting that anyone, no matter how healthy in the present, might fall ill in the future, everyone becomes a “patient-in-waiting” (Sunder Rajan 2006:175) who would benefit from “predict and prevent” pharmacogenetics.

Another much-publicised research avenue combines genetic information and technologies with those concerning cell behaviour, development and manipulation (particularly of stem cells, both embryonic and adult) with the aim of regenerating damaged or failing body parts and treating, if not curing, many diseases.

Umbilical cord blood banking, meanwhile, stores the present for the future. Stem cells in this blood have been used for over a decade as an alternative to bone marrow transplants between unrelated but closely matched donors. But many parents now opt to capture and freeze (for a fee) umbilical cord blood in case future research finds ways to treat their child with it if they became ill. Such commercial banking “rests fundamentally on the future-oriented promissory value of regenerative medicine . . . embedded largely in future potential rather than present utility” (Martin, Brown, Turner 2008:132). Indeed, stem-cell research and regenerative medicine are particularly “based on promises for future innovation, the imagined unfolding of new, life-giving advancements down the road” (Romain 2010:210).

In sum, “biotech . . . is today synonymous with the language and imagery of futuristic breakthroughs” (Brown 2003:4). As a result, discussions and decisions about health and biotechnology tend to be based less on facts and evidence and more on hopeful, future-oriented values and abstractions (Brown 2005:332). Sociologist Sarah Franklin believes that “imagining a future yet to be . . . fundamentally defines the whole issue of the new genetics and society” (Franklin 2001:349).

Occasionally supporters of biotech R&D depict threatening rather than therapeutic futures of more and more people starving, suffering and dying if the research does not proceed. As long-standing US genetic activist Ruth Hubbard pointed out nearly two decades ago:

“If an atmosphere can be generated in which none of us feels safe until we have assessed the likelihood that we or our children will develop sundry diseases and disabilities, we will be willing to support this new industry”(Hubbard, Wald 1993: 118).

And it is to gain support – financial, political and public – that future-oriented abstractions are invariably mobilised. Financial support is an obvious prerequisite for enabling biotech R&D. Political support has been needed to push through legislative and policy changes, particularly allowing patents to be awarded on genes and living organisms, and permitting publicly funded scientists to hold such patents on their basic research and to set up private biotech companies spun out of their university work. And public support, albeit tacit or acquiescent, is considered essential, not only for these legislative and policy changes and for financing, but also to supply human biological material, participate in clinical trials, and eventually use any resulting products.

## **FINANCIAL FUTURES ON FUTURES**

*“Financialization has . . . relied on the process of commodification of every aspect of human life and the life course.”*  
(Birch, Mykhnenko 2010:13)

*“The range of derivatives contracts is limited only by the imagination of man (or sometimes, so it seems, madmen)”.*  
(Warren Buffett, quoted in Lanchester 2010:43)

“The future” has also become key to global finance over the past three decades – or rather ‘a’ future: a legal agreement to buy or sell a specified asset at a specified price on a specified date in the future. The agreement itself – the future – can be bought and sold, and is therefore classed as an asset. Another similar financial instrument is an option, which confers the right – but not the obligation – to buy or sell an asset in the future at an agreed price in return for a small down payment. A third type is a swap, an agreement to exchange assets at agreed prices on some specified date in the future. The three types of agreement to do something in the future are collectively known as derivatives because their value is derived from some external variable. Those who buy derivatives are betting on the future direction of the underlying asset’s price.

Farmers have long used derivatives to insure themselves against risks and uncertainties, such as bad weather, so as to get a good price for their crops at harvest time. In their current guise, however, innovation (a key theme in biotech) has changed derivatives into agreements that would be unrecognisable to any farmer of yesteryear. Agreements are now made not only on the future price of a sack of rice, a bushel of grain or a can of milk, but also on stock market indexes of commodities, on future differences in interest rates, exchange rates and currency rates, on the prices of stocks, shares and bonds, and on the credit-worthiness of companies and countries. Derivatives have enabled virtually everything to be priced, commensurated, bought and sold. They have been cross-linked and embedded within yet more contracts and agreements; assets have been bundled together and the whole portfolio “sliced and diced” into tranches and sold on. Futures on futures can now be bought and sold, “accumulating promise from promise” (Cooper 2008: 142).

Before the 1970s, financial markets for derivatives were marked out as hazardous and limited in size, or were simply banned. As with the development of the biotech industry, however, active lobbying for government regulation, deregulation and re-regulation, such as removing prohibitions, allowed and enabled financial markets in derivatives to develop, leaving their agrarian insurance origins far behind. Today, they provide extensive opportunities for speculation – the practice of trying to profit from changes in fluctuating prices. The scale on which derivatives have been created and marketed is such that speculative capital far surpasses trading capital – producing and selling goods and services for a profit. Moreover, “the rise of speculative capital offers the disquieting spectre of a future emerging as if *ex nihilo* – held aloft by the mere promise of surplus-value”. Speculation is “an affective art of promise, expectation and panic where, in a real sense, price is no longer referenced to some fundamental value anchored in the past but surfaces as the emergent effect of ‘our’ collective valuations of the future” (Cooper 2006:7).<sup>1</sup>

## **SPECULATIVE ACCUMULATION OF BIOTECH FUTURES**

*“Completion isn’t promised by genomics; future becomings are.”*  
(Fortun 2008:47)

*“The genomic industry itself knows full well that it’s an inescapably volatile and speculative endeavor.”*  
(Fortun 2008:280)

Many parallels can be drawn between the imagined futures of biotechnology R&D and of “Star Trek finance” (Tett 2010). But the paths of the promissory futures of biotech and

“future-looking financescapes” (Helmreich 2008:465) also cross each other through speculative capital in the form of venture capital, which usually engages with young biotech companies until they launch themselves on a stock market, and of hedge funds, which buy the shares.

Venture capital support for early stage R&D has been the standard pattern of biotech company development, particularly in the United States. Some contend that biotech would not have emerged as an industry were it not for “the willingness of venture capitalists to invest in a technology that had little credibility at the time [1980s] as a successful business model” (Sunder Rajan 2006:6). Venture capital is money given to a fledgling biotech company in return for a financial stake and (usually) a management role in the company.<sup>2</sup> Venture capitalists hope to make a return on their cash by selling their stakes (usually within 6-10 years), either directly to another buyer or through a stock exchange after the company has issued shares for the first time.

But speculating on biotech firms is precarious. Patents are regarded as providing some guarantee at the point of entry while a stock market flotation has been the assured exit route. Without these, even adventurous capital has been unlikely to venture forward.

Patents are at the heart of the logic of the speculative capital deployed in biotechnology.<sup>3</sup> A biotech company in its early stages often has no new drug, test or tool in its pipeline, in clinical trials, let alone on the market; it has no revenue stream, never mind profits; it has no tangible assets. What it does have, however, is a vision of a promised future. If scientists can capture this future by obtaining a patent on their initial research (even if the research has been paid for by the public purse), the company can offer “a proprietary claim over the future life forms it might give rise to, along with the profits that accrue from them” (Cooper 2008:28). From the company’s perspective, the patent is the valuable commodity rather than any isolated gene, genetically modified living organism or new technological process that might be the subject of the patent. “Patents are symbols that can be used to impress investors”, says one biotech lawyer; they can be hoarded to attract capital, even if their value is “marginal or unknown” (Hoag 2009: 409). In the entrepreneurial science of biotechnology, “it is more important to own the speculative value of a cell line, through title to its ‘intellectual property,’ than to own the cell line itself” (Cooper 2008:190). Just as futures and other derivatives allow a speculator to profit from the buying and selling of commodities without actually owning any commodities themselves, so, too, “the biological patent allows one to own the organism’s principle of generation without having to own the actual organism” (Cooper 2008:24).

Advocates of financial futures point to homely farmer hedging traditions, even though their innovations are fundamentally different. Similarly, supporters of biological patents recall a long history of patents being a reward for inventors, but biotech patents mark a “fundamental rupture” in that history by encompassing not only living organisms but also *future* inventions as well as present ones (Cooper 2008:189). This rupture is particularly striking when considering human embryonic stem cells, which have the ability to reproduce themselves indefinitely and to become any one of the 220 or so different kinds of cell in the human body – stem cells tend to be defined speculatively by what they could do rather than what they are (Cooper 2006:15). Regenerative medicine aims to harness this speculative ability, but there are still substantial doubts as to whether the research will yield any safe therapeutic product. In the context of such fundamental uncertainty, “the biological patent responds to the unpredictable potentiality of the ES [embryonic stem] cell line by inventing a property right

over the uncertain future” (Cooper 2008:144). The actual economic value of an embryonic stem cell “lies not so much in its powers of self-regeneration as in the formulation of an essentially new form of property right designed to capture its future possibilities of growth – *even when they defy all prediction*” (ibid, italics in original).

Stock market regulation and innovation – explicitly regarding a patent as an asset – together with extensions in patent law – allowing patents on genes and living organisms – institutionalised the promissory market in biotech innovation and formalised “the prospective value of promise” (Cooper 2008:28). A combination of stock market and patent reforms “transformed the nature of life science research in such a way that the mere hope of a future biological product is enough to sustain investment” (Cooper 2008:26).

The next phase of risk-taking comes when shares in the biotech company are bought (or so venture capital hopes) by outside investors and speculators unknown to the company. In recent years, hedge funds – largely unregulated financial vehicles catering to the super-rich, pension funds and university endowments – started to snap them up. These funds are renowned for exploiting swings in share prices – swings that go down as well as up. They profit from drops in share prices through the practice of short-selling: a fund borrows shares in the biotech company and sells them; when their price drops, it buys them back – at a lower price. Instead of the usual speculative practice of buying low and selling high, short-selling involves selling high and buying low.

For those banking on share prices going up, it is not good news when a biotech patent is challenged, research doesn’t yield the promised results, a drug trial is not approved, a clinical trial suggests the product isn’t safe or doesn’t work, or a product isn’t approved by drug regulatory authorities. A hedge fund, however, can profit from bad news. “Whether a biotech company realises its promises or not doesn’t necessarily matter to a hedge fund; it “can make money either way”(Ransom 2006).<sup>4</sup>

## **WHAT SPECULATIVE HEALTH FOR WHOM?**

*“The past is littered with failed futures”*  
(Brown 2003:7)

*“The promise of biotechnology [is] not reflected in the reality”*  
(Pisano 2006:xi)

Both the for-profit financing and provision of health care and the genetic approach to health have long been criticised by public health activists. Are speculative biotech health futures any different?

For-profit health care is self-explanatory: certain products and services are available to certain individuals if they can be designed and provided so as to generate profit, even if subsidised by the public purse. If not, they’re not. The “Genes R Us” blueprint of health, meanwhile, has been censured by many biotech researchers as well as public health activists. Privileging the role of genetic anomalies in causing disease downplays that of the genes’ “environments” and of the social, ecological, epidemiological and evolutionary context in which disease emerges and spreads. Given life’s capricious complexity and its embedded interconnections with various environments, it is not surprising that genetic research (with a

few notable exceptions) has delivered so little. Even the UK geneticist turned millionaire venture capitalist entrepreneur, Sir Christopher Evans, admitted a few years ago “nothing in biotech has ever come to anything yet” (Brun-Rovet 2003:18).

But the involvement of speculative capital in biotech R&D means that *there is no need for it ever to do so*. Whereas investors will abandon biotech companies when they fail to bring products or services to market, the speculative capital underpinning biotech companies and their futures does not need them to deliver anything at all in either the present or the future. All a biotech company has to do to generate value in the present is to sell a vision of the future, “even if it is a vision that will never be realized” (Sunder Rajan 2006:115-116). At some fundamental level, “it does not *matter* whether the promissory visions of a biotech company are true or not, as long as they are credible” (Sunder Rajan 2006:114-115). The mechanisms are clear:

“the basic dynamics of the futures market means that expectations are capable of generating enormous near term share value (with which to conduct research or financially reward research staff), but without any necessary requirement for entrepreneurs to fulfil their longer-term promises” (Brown, Michael 2003:13).

Whereas for-profit health care means that products and services are provided only to those who can pay for them, speculative biotech health research means that there are not necessarily any products or services at all for anyone, rich or poor, sick or healthy, living or dead.

When promised futures repeatedly fail to materialise and doubts over the credibility of such promises surface, public relations becomes critical. In the world of speculative biotech, really successful marketing demonstrates itself not in the articulation and promotion of over-hyped futures but in “the closure of the gap between what is envisioned and what is (inadequately) achieved” (Sunder Rajan 2006:126). Another response has been loudly to draw attention to the handful of clinical applications that have emerged (some of which are undoubtedly of health giving and life saving benefit) while quietly abandoning research lines that haven’t delivered. Novel biological drugs, particularly those that address cancer, are considered among the most tangible fruits of biotechnology, while far less is heard today about xenotransplantation or gene therapy (Brown 2003: 4, 9).

A further strategy has been to promote products for conditions other than those for which they were originally developed. To expand markets for genetic technologies (as well as related reproductive and pharmaceutical ones), regulatory and public approval is obtained for a drug to treat a medical condition; the drug is then promoted for other uses that many more (healthy) people could be expected to take up for social or cosmetic reasons.<sup>5</sup> Injections of stem cells derived from aborted fetuses were developed to treat Parkinson's disease and blood disorders, but are being advertised as anti-wrinkle treatments. The beneficiaries of stem cell breast implants are described as cancer patients who have had mastectomies, but promoters are eyeing up women who would like breast or lip enlargements.

## **THE MUSIC STOPPED AND THE HOUSE FELL DOWN**

When the global financial system started unravelling in 2007, the biotech industry was not particularly affected by the “credit crunch” – a shortage of lending from banks – because

most biotech firms finance their activities by selling stakes in their companies. In addition, “because 95% of biotech companies don’t yet sell anything, the bad economy did not have much effect on them” (Fox 2010:196). But by 2008, after share prices on stock markets slumped, initial public offerings came to a standstill, which meant that little capital ventured forward because its exit route was closed. Confronting a “life threatening” (*Nature Biotechnology* 2009:1) inability to raise finance, the biotech industry turned to governments, Big Pharma and health insurance.

In the US and the UK, the biotech industry asked governments to ride to their rescue by providing bail-out funds and tax credits. Biotech entrepreneur Evans and 20 leading scientists lobbied the UK government to set up a £1 billion venture-capital style biotech fund to invest directly in biotech companies, with half the money coming from taxpayers. Accusations of a lack of state support, however, ignore the extensive assistance that many governments have given the biotech industry over the past three decades, not only through policy changes, but also financially with the expressed goals of stimulating national economies, competing with other countries and creating wealth (not health) (Cooper 2006:17, Wallace 2010).

Large international pharmaceutical companies (Big Pharma) have been turning to the health biotech industry for many years because the patents on a record number of their blockbuster drugs are expiring, and companies have little in their pipeline to replace them. Once a 20-year patent runs out and any company can legally manufacture a drug, sales usually drop by 90 per cent. In the hope that new, patented drugs derived from biological and genetic research will treat this problem, large pharmaceutical companies have developed a range of strategic partnerships and alliances with biotech firms. Several analysts believe that “this fundamentally risky and radically novel technology” would not have developed if the pharmaceutical industry had not provided it with a “protective niche” (Arundel 2000:86). With biotech financing in need of rescue, Big Pharma has been enjoined to protect more proactively by buying up technologies, drugs or companies outright. Big pharmaceutical companies not only have the money to do so – on average, each of the top-20 companies has access to some \$7.5 billion in cash – but they also know that biotech companies are going cheap in the financial down-turn.

US health insurance companies might become interested in funding biotech research since “the most comprehensive piece of legislation concerning healthcare provision in the United States since . . . 1965” was passed in March 2010 (*Nature Biotechnology* 2010:293). The legislation requires insurers “to embrace the sick wholeheartedly and for as long as they are sick” (ibid), which will raise company costs and lower profitability. The biotech industry suggests that costs could be reduced by detecting and preventing disease earlier with its tools, thereby reducing the number of sick people.

But all these alternative financing avenues are considered small compared to previous levels of venture capital funding. For a biotech company (as for so many other companies, individuals and countries), “no matter where one sits on the economic spectrum, the future looks less prosperous and less safe” than it used to (Scangos 2009:424). The Global Financial Crisis will be “transformative” for the biotechnology industry (Friedman 2010:1), not least because it has made more transparent how unsuccessful speculative biotech futures have been. “The business of science in biotechnology has not yet been profitable, nor has it been particularly productive in terms of turning scientific advances into drugs,” said business school professor Gary Pisano (Pisano 2006:202). *Financial Times* journalist Jonathan Guthrie is more succinct: “Genomics has largely flopped” (Guthrie 2010:18).

## COLONISING THE FUTURE

*“What is called for is something like a creative sabotage of the future”*  
(Cooper 2008:99)

Reflection on the past three decades of speculative financial and biotech futures and their moment of (near) collapse illuminates several known insights for pursuing public health futures and finances that are usually kept in the dark and conveniently forgotten

The first concerns the biotech industry’s strategic use of the future. Instead of relying on established practice and proven evidence grounded in present and past realities to plot a route to the future, research starts from what is speculatively possible in an abstract future and works back on the present. Instead of the past being a guide to future action, the future (implausibly) becomes a guide to the present. Colonising the future captures the present. It draws “an imagined future into the real-time now” (Brown 2003:17) so that particular technologies seem obvious solutions to which resources, particularly funding and regulations, must be directed immediately. Decision-making is channelled towards techno-knowledge utopian fixes that harness and commodify genetic and bio-molecular science (Birch, Mykhnenko 2010:2). If “technological change is . . . a process of constant oscillation . . . between present problems and future solutions” (Brown 2003:6), it matters how those problems are described, characterised and analysed, and by whom. The political use of the future smothers not only alternative descriptions, analysis and framing of the present, but also solutions to them.

Mobilising an imaginary genetic future not only frames health, disease and medicine in individualised genetic terms, but also thrusts the present structural causes of ill-health into the background, diverting attention away from social and political dynamics: lack of access to food, livelihood and health care services, and exposure to poverty, pollution and other stresses. Besides depoliticising the present, the colonising power of the future also side-steps questions about how a genetic approach to health may exacerbate structural causes of ill-health. The inaccessibility of existing treatments and health care services in the present, never mind the future, is considered unrelated to this approach in analytical, policy or funding terms. Two writers on “The myth of the biotech revolution” have concluded:

“Unrealistic expectations are dangerous as they lead to poor investment decisions, misplaced hope, and distorted priorities, and can distract us from acting on the knowledge we already have about the prevention of illness and disease” (Nightingale, Martin 2004:568).

As Ruth Hubbard stresses, although high-tech treatments can turn out to be a “real boon” to a limited number of individuals, they unfortunately “drain resources away from the kinds of public health and medical measures that could improve the health of a much larger number of people” (Hubbard, Wald 1993:112). Many governments have made political commitments to looking for the causes of disease and ill-health within the body, in particular to the supposedly determining genetic code, rather than outside the body at the consequences of everyday life and people’s environments (Wallace 2010:14).

Contrasts between private and public umbilical cord blood banking illustrate how the present and future are inseparably entangled but different health care outcomes realised. Irrespective of whether the promise of using a baby’s umbilical cord blood to treat their potential injury or



disease in future is ever realised, families still have to pay the private cord blood bankers' collection and storage fees, which now provide "a highly profitable source of revenue" of some \$100–\$200 million annually (Martin, Brown, Turner 2008:135, 136). Public cord blood banks, however, treat patients "living in the here and now" with proven therapies (ibid:137). Commercial cord blood banking thus represents "a shift away from the shared public ownership of a collective resource to be used in facilitating currently available treatments for known diseases . . . toward the privatized storage of cells for personal use (and also commercial profit) in a range of currently unrealized technologies" (Brown 2005:342).

GeneWatch UK's conclusion about the consequences of the speculative approach to health (and agriculture) research is direct:

"It has . . . exacted a high price in human lives due to wasted opportunity costs by acting as a distraction from more immediate, lower-cost alternatives. This is partly because ensuring that existing treatments and a varied, balanced diet reach everybody would save a lot more lives than any possible technological developments; and partly because the system distorts the research agenda away from human needs as well as from the broader development of scientific knowledge and understanding. The problem is not that commercial interests should not play a role in funding and helping to drive (at least some) R&D investment, or that technology (including biotechnology) has no positive applications, but that the system of policies and incentives created to drive the 'knowledge-based bio-economy' is deeply flawed" (Wallace 2010:10).

The challenge for public health activists is to contest the futures presented as inevitable, to "become more sensitive to the many hidden futures that hype so often silences" (Brown 2003:18) and to imagine other futures and ways of getting there. It is in our actions in a grounded present that we build and realise these visions of the future.

## **HEALTH FOR ALL**

*A focus on individual biological differences is . . . unlikely to deliver significant improvements in public health*  
GeneWatch UK 2002

After the biotech industry's strategic use of the future, a second insight into pursuing public health futures and finances relates to health more directly. When the global financial system was on the brink of collapse in 2008, bankers, financiers and policy makers proposed several measures to get the system up and running again. Others, however, pointed out that it might be wiser *not* to fix the broken system given its potential to wreak such damage with dire consequences for all, but to ask first a basic question: what is finance for?

A similar approach could be considered with biotech R&D. Before trying to fix a system that has delivered neither health nor wealth, it might be more productive to ask whether speculative finance is the best way to fund health innovation and whether wealth (rather than health) should be the goal of such innovation. It would be more fruitful to reassess and reclaim what is needed for health, and then to consider what role biotech might play.

Research into the human genome has in fact consigned the idea of one gene, one condition to the history books for the vast majority of diseases and conditions. The substantial information

resulting from genetic research is undermining genetic determinism as it becomes less and less clear how genes “work”. Biologist Jim Collins says that “We’ve made the mistake of equating the gathering of information with a corresponding increase in insight and understanding” (Ball 2010: 65).

Even those few conditions clearly linked to single genes often cry out for more attention to the environment of the sufferers. Consider sickle-cell disease. Chuck Adams, a social worker in a children’s hospital in Philadelphia, points out that living in a cold, abandoned building without adequate food heavily affects those with sickle cell disease. “They just happen to have a chronic genetic disorder,” he says, “but being poor was probably the first disorder that they had to deal with” (Sexton 2002). Helen Wallace of GeneWatch UK concurs: “The big risks for most diseases are not inside your genes but in the world outside (GeneWatch UK 2010b).

Genetic research is not necessarily providing what is needed by sick people, including those with “precarious futures . . . who are desperate for treatment” (Brown 2003:8). When the goal is monetary profit from the research process, “manufactured scarcity” is the result, compounded when health care itself is a profit centre determining what tests and treatments are provided to whom.

Given the “absolute scarcity” of treatments for some diseases, conditions and injuries, however, how can public health activists judge whether promissory claims of future benefits of biotech research are “true”? It is widely acknowledged that “early stage genetic technologies are difficult to analyse, both in terms of the direction of their development and the social and ethical issues they raise” (Hedgecoe, Martin 2003:355). The task is made harder when they are embedded within “the knowledge economy of expectations” (Brown 2003:16) and “surrounded by too much ‘hype’, speculation and unsubstantiated claims” (Hedgecoe, Martin 2003:328). A first step would be to engage more with genetic researchers working within “the privately cautious world of bench science” (Brown 2003:16) than with their business or PR managers or speculators. Those closer to the research tend to be far more aware of the difficulties, doubts and uncertainties – past, present and future – of realising ambitious promises. Many have experienced time and again how unanticipated hurdles have stalled promised innovations (Brown, Michael 2003:14, 16).

Another step would be to scrutinise the interests behind various genetic findings. GeneWatch UK has documented how the tobacco industry infiltrated top scientific institutions in the US and UK to promote the false theory that smokers’ risks of lung cancer and likelihood of smoking are in their DNA. “Leading scientists endorsed the hunt for genes that don’t exist, creating a vast gravy train of funding for the human genome and a false message about cancer in the press” (GeneWatch UK 2010b; Wallace 2009). The pharmaceutical and food industries have promoted false claims that human genome sequencing will predict killer diseases in an effort so as to market healthcare products at healthy people and create confusion about the role of processed foods in hypertension, diabetes and obesity. The chemical and nuclear industries have also sponsored genetic research (GeneWatch UK 2010a).

All this information, combined with awareness of “the actual contexts and conditions in which expectation, hype and future imaginings are embedded” (Brown 2003:10) and the knowledge that public health advocates already have, can change the conversation. Rather than taking promised benefits at face value, questions can be asked that turn the spotlight away from utopian future abstractions back to present realities, messy and complicated as

they are. When a South African farmer was asked whether he would welcome crops genetically engineered to be drought-tolerant, he replied: “First, we need land reform”. Health For All rather than Genes R Us needs to be placed at the centre of health research, policy and funding.

## TAKE ECONOMICS SERIOUSLY

*“Biotechnology is a form of enterprise inextricable from contemporary capitalism”*  
(Sunder Rajan 2006:3)

*“Money matters, in science as elsewhere”*  
(Clarke 1998:207)

*“The most important lesson from the crisis of capitalist finance  
is that there is an alternative”*  
(Mellor 2010:175)

A third insight after consideration of the future and what is needed for health for all concerns finance. It is sometimes claimed that it does not matter whether the public or private sector pays for “public goods”, how money is raised to pay for them, or whether some interests profit from them, as long as the goods are delivered in the end. Public health advocates have shown that the financing mechanisms do affect what is provided to whom. But when the life sciences and biological materials are subject to the logic not just of commodification – “this is a foregone conclusion” (Cooper 2008:148) – but also of financialisation and the speculative self-regeneration of profit, no goods need be delivered at all. If biotech research is to serve public health needs, its core structures need to be reshaped, re-employed and undistorted away from “the creation of surplus value” (Tyfield 2009:498).

Several economists advise banning speculative futures and other derivatives, since they operate against the public interest, or at least substantially restricting their use (just like guns, drugs and other potentially dangerous products) unless they can be unambiguously shown to benefit society in the long run. Others believe that the whole financial system must be downsized and its political dominance, both quantitative and political, over the entire global economy challenged more fundamentally “or we can expect even worse crises soon after the current one is stabilised” (Tyfield undated:1).

Although some Western governments have put failing banks into public ownership, the power dynamics involved suggest that the process is not nationalisation but “a profound deepening of the reverse takeover of the state by finance” (ibid:2). Something similar has happened with biotech R&D given that the “symbiotic relationship between industry, university and governments” has blurred the distinction between “public” and “private” in many instances (Lynskey 2006:134-135). Reclaiming health, research and finance requires reclaiming the “public” and the “state”. What form of governance might work best to ensure not simply public control but exercise of that control for the public good? What political processes might be nurtured to encourage debate and consensus building around what constitutes the “public interest”? Should the public continue to allow their governments to move away from protecting the public’s health towards facilitating the speculative economy on the back of public health research? Is the primary function of public health agencies to protect the public, or to stimulate the economy through biomedical research

commercialisation? Should the function of public sector funding and regulation be to assist the goals of speculative capital, or to defend the public interest against them?

Similar questions need to be asked about genetic research. Is the science of human cells and genes there to fulfil the promise of a better life for all, or to serve the ends of some speculators? Drawing attention to how biotech research is financed is not to suggest that researchers and geneticists are simply financial speculators in disguise. Undoubtedly, the majority are interested in a fascinating science and want to save lives, just as the majority of those working within health care services do, even if the institutional structures within which they work, often for low pay, prioritise wealth over health. But hard commercial realities do not sit comfortably with researchers' belief that their work will have genuine medical benefits and reduce human suffering (Knowles 1999:40).

## CONCLUSION

The story of a poor young black tobacco farmer in the United States, Henrietta Lacks, epitomises the promises and pitfalls of bringing biotech futures into the present. In 1951, she developed a vicious type of cervical cancer. Before it advanced, a doctor took a tissue sample (without her knowledge or consent) and cultured it in a lab dish. Her cells doubled relentlessly every 24 hours, even though scientists had tried (and mostly failed) for years to grow human cells in culture. HeLa cells are now found in their trillions in virtually every biomedical lab in the world. An estimated 99 per cent of knowledge about human microbiology is believed to have been derived from them. They were involved in developing the polio vaccine, in vitro fertilisation, gene mapping and drugs to treat AIDS. Researchers continue to use them in exploring how external agents cause DNA mutations and how the environment triggers genes in normal DNA to turn off and on.

Yet while biotech and pharmaceutical companies have profited from selling HeLa cells or the drugs made possible by them, Henrietta Lacks died at the age of 31, was buried in an unmarked grave, her husband and children were not told about her cells, and many of her human descendants suffered ill-health from under treated medical conditions because they had no health insurance (Skloot 2010).

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1 See Hildyard 2008, Lohmann 2009, Lanchester 2010, Singh 2008, Singh 2010.

2 Venture capital typically comes from institutional investors and high net worth individuals, and is pooled together by dedicated investment firms. A venture capital firm will spread its money around several biotech firms rather than putting all into one.

3 An estimated 40,000 patents have been granted relating to some 2,000 human genes. Patents and intellectual property rights more generally are also key in financial accumulation (Sikka, Willmott 2010).

4 A common hedge fund technique is to adopt a long/short strategy: owning a portfolio of biotech companies (long) but short selling a corresponding biotech index to limit the risk if the biotech market goes down. Hedge funds are allowed to borrow money to buy more shares by using the value of their existing portfolios as security. Another approach is to buy shares in a biotech company, get it to file for bankruptcy, liquidate the assets and distribute the resulting cash to shareholders.

5 Prospective genetic-based drugs to treat diabetes and obesity are being considered as diet drugs; those for muscle wasting diseases to be consumed by athletes; those to combat memory and brain function loss to improve intelligence; anti-depressants to overcome shyness; and drugs that treat incontinence by reducing the thinning of ageing skin being taken to lessen the appearance of ageing.

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