

nature biotechnology

China calling

The Chinese market is a big draw for biotech investors, but overreliance on central control and insular vision could derail the sector.

A notable addition to last month's JP Morgan Healthcare meeting in San Francisco—the annual schmooze fest for biotech investors and entrepreneurs—was the 'China Track'. By all accounts the inaugural session was a success, with standing room only for the presenting Chinese biotech companies. Only a few years ago, the specter of red tape, insecure intellectual property and government interference would have sent most biotech investors scurrying for the exit. But in recent years, nearly every multinational pharmaceutical company has established R&D centers, manufacturing facilities and business development offices in China, with the aim of accessing low-cost local talent, outsourcing preclinical and clinical work and, most importantly, getting a slice of the \$40 billion prescription drug market—a market that is growing at a rate of 25% a year.

With a growing middle class, China has 1.34 billion citizens, who represent 20% of the world's population. According to consultants IMS Health, 90% of them will be covered by some form of health insurance in 2011. High population density, wide access to insurance and regional disease prevalence means that indications less common in the West, such as liver cancer, and head and neck cancer, will be attractive markets in China.

The economic outlook is rosy, at least relative to the gloom-mongered, belt-tightening picture that seems to be the norm in North America and Europe. For most of the past decade, Chinese gross domestic product (GDP) has been growing at an annual rate of ~10–15% and even the rates projected for this year outshine Western performance manifold.

Research and development is a boom business, too. Chinese government officials plan to grow R&D spending from 1.5% of GDP today to 2.5% in 2020 (rivaling the United States). Four of the world's top 25 institutions publishing biotech-related research are in China, which now publishes more biotech papers than the US, albeit with lower citations.

The country boasts over 100 life science parks and incubators, with Zhangjiang Hi-Tech Park in Shanghai, Zhongguancun in Beijing, BioBay in Suzhou and a cluster in Guangzhou/Shenzhen and Hong Kong among the largest. Thus, it is already close to building a critical mass of companies for a self-sustainable biotech workforce. According to the Chinese government, 55.8 million scientific and technological personnel are working in state-owned enterprises and institutions (a few million shy of the population of the UK, France or Italy—or California and Texas combined).

So, with a cornucopia of qualified talent, R&D expansion and increasingly affluent and health-conscious consumers, what are the caveats?

One issue is that much of the access to finance and, indeed to the product markets, is largely state controlled. With few venture capitalists in China, the government shapes the sector. The central party has enormous resources at its disposal (it earmarked \$125 billion for medical reform in the 2009 stimulus bill), issues five-year plans for priorities in R&D investment and sets matters of national urgency, such as fostering innovative biotech. It also supports work in the commercial arena

by funding National Program 863, which awards grants to science and technology projects of commercial value.

In 2009, the 'Mega New Drug Development Program' was launched, which slates \$12 billion over 13 years to spur homegrown drug development companies with grants up to nearly \$200 million. Similarly, domestic startups receive subsidies, tax holidays and other support from provincial and municipal governments, where officials vie for the 'prestige' of hosting a biotech cluster.

In short, the commercial environment in China strongly favors not only homegrown firms but also those whose activities fit best with a government vision of the future.

Implementing that vision certainly creates some opportunities. Take BGI in Shenzhen, for example, the erstwhile Beijing Genomics Institute. BGI has around 1,500 bioinformatics specialists and supercomputers with a combined capacity of 25 teraflops. Last year, it bought 128 new HiSeq 2000 Illumina genome sequencers, at a stroke doubling the world's sequencing capacity.

In genomics, China is already poised to lead the world, and projects that are easily translated from genomics know-how would seem to have a high chance of success there: personalized medicine, diagnostics, animal and plant biotech.

However, in innovative drug development, the picture is less clear. Clinical trials expertise is being honed, yet most Chinese pharmaceutical companies lack any R&D and only a few of the country's centers of excellence and translational research are in the global top tier. In this context, it might be wiser to focus on small molecules, replacement proteins, vaccines and antibodies rather than experimental biotech treatments (e.g., gene, stem cell and RNA interference therapies) where so many technical issues remain.

China's state-driven biotech model is thus a mixed blessing. It is building infrastructure and facilities at an unprecedented pace and scale. But its strategy and ambitions are politically driven. If technology push has been bad for biotech elsewhere, political push in China could be worse. Furthermore, bureaucracy in the State Food and Drug Administration, the State Intellectual Property Office and even customs offices (which monitor the traffic of reagents and materials) all slow biotech R&D. Many of the leaders at universities, the Chinese Academy of Sciences and industry are in party cadres, encouraging a culture of cronyism. For this reason, scientists returning from abroad—who are essential to fostering critical thought and a global perspective—are not always met with open arms.

In the long term, ensuring that China's scientific institutions are competitive internationally will help build a biotech sector that is both innovative and sustainable. In this respect, it's encouraging that the government has started to recognize this. The 12th Five-Year Program, announced at the end of last year, specifically mentions the importance of promoting openness and international collaboration in the future. 