NEWS AND VIEWS

Innovation in Chinese medicine

Traditional medicine still plays a significant role in the Chinese healthcare system yet the past fifteen years have seen rapid growth in the biopharmaceutical industry, both for the production of generic medicines and the development of new drug candidates. Indeed, in 2003 China became the first country to approve a gene therapy reagent, Gendicine for treatment of squamous cell carcinoma of the head and neck. More recent news suggests that China's SFDA is close to approving the world's first oncolytic virus for cancer, seemingly placing it to rival the US in new drug development.

Significant government investment and favourable intellectual property laws are driving expansion in the Chinese biopharmaceutical industry, though true drug development still lags behind. Of the 10,011 new drug applications in 2004 that followed the approval of Gendicine, the majority involved only modifications to delivery of existing pharmaceuticals or newly imported drugs, rather than truly new chemicals. Chinese firms closely follow foreign literature and the progress of clinical trials conducted abroad. Potential therapeutic compounds that have been identified in the literature, but not patented in China, may be legally duplicated by Chinese firms - offering a "step up" the development ladder for an industry for which R&D efforts are still maturing.

The increasingly open Chinese market offers much to foreign investors. China has the resource of many centuries traditional medicine to draw upon, and offers attractive benefits in terms of tax and labour costs, and a foothold on the expanding Asian pharmaceutical markets. An example of the modern development of a traditional therapy is the derivatives of Indirubin, a compound isolated from a traditional Chinese medicine with antiluekemic properties. In the mid-1960's Chinese researchers discovered that Danggui Longhui, a blend of 11 medicinal herbs, was effective against chronic myelogenous leukaemia (CML), and set about isolating the active ingredient. Within 10 years, Indigofera tinctoria had been identified as the key constituent, and from this indirubin was isolated as the active compound. Indirubin was used to treat some cases of CML by the late-1970's, but was discontinued due to poor water solubility and gastrointestinal health issues. Derivatives such as meisoindigo have been subsequently developed and are widely used to treat CML, and have entered phase II trials in combination therapies for acute promyelocytic leukaemia. Western scientists have also taken note of Chinese efforts, and are exploting the antitumour activity of indirubin. Gehrhard Eisenbrand and collegues at the University of Kaiserslauten, Germany have previously identified indirubin analogues as potent cyclin-dependnet kinases (CDK) inhibitors, controllers of the cell-cycle. More recently they reported that the indirubin derivative E804 directly inhibits Src kinase phosphorylation of the Stat3 transcription factor, thus downregulating the downstream expression of anti-apoptotic proteins Survivin and Mcl-1, explaining how it might induce apoptosis. The broad specificity of indirubin derivatives offers a therapeutic advantage over single molecular target reagents by making it more difficult for cancer cells to overcome the inhibition. Eisenbrand is looking forward to taking some multifunctional indirubin derivatives to clinical trials early next year. Although most prominently researched as cancer therapeutics, species discriminating CDK inhibitors might also have potential uses outside the cancer field, such as inhibiting parasite protein kinases during malaria infection.

A rich history in natural remedies and a growing biopharmaceutical sector keen to identify and harness the potential of novel therapeutic compounds is making China a powerful force in the global pharmaceutical market. A number of large manufacturing firms are already seeking to gain a foothold in China and such investment offers to solidify the Chinese position and provide a base for expansion of both research and marketing capacity. It seems increasingly likely that the Chinese biopharmaceutical industry will soon be challenging those of the US and Europe for a share of the global market.

REFERENCES

Chenoweth D. 2005. Drug Disc Today, 10, 1140-1142.
Nam S et al. 2005. Proc Nat Acad Sci USA, 102, 5598-6003.
Yu H and Jove R. 2004. Nat Rev Cancer, 4, 97-105.
Chervenak M. 2005. Drug Disc Today, 10, 1127-1130.
Bradbury J. 2005. Drug Disc Today, 10, 1130-1131.