

## Cheaper drugs, vaccines forecast as collaborations grow between developing countries' biotech firms

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The availability of more affordable drugs, vaccines and diagnostics that would help countless people worldwide is the foremost benefit expected from a growing number of collaborations between biotech firms in developing countries, according to a study to be published Mon. May 12 in the UK journal *Nature Biotechnology*.

Researchers from five developing countries, together with colleagues at Canada's McLaughlin-Rotman Centre for Global Health, interviewed over 300 experts in 13 developing countries to produce the first-ever large scale study of "south-south" collaboration in health-related biotechnology.

They found health biotech firms in Africa, Asia and Latin America are increasingly building trade and marketing links and pooling resources to address shared <u>health problems</u> in countries where a large proportion of the population can only afford low-priced health products.

When these developing country firms fully leverage their respective strengths, they could deliver health products that reach far more poor people than products from firms in rich countries, according to the study.

The international research team focused both on collaboration in research, typically carried out by universities and public research



organisations, and collaboration in entrepreneurial activities, typically carried out by firms.

They say more than one quarter of health biotech firms in Brazil, China, Cuba, Egypt, India, and South Africa have built linkages with other developing countries as south-south collaborations start catching up to more traditional north-south partnerships.

Says project leader Halla Thorsteinsdóttir of the McLaughlin-Rotman Centre for Global Health, at the University Health Network and University of Toronto: "The key finding is that biotechnology firms in developing countries are becoming less dependent on relationships with similar firms in the industrialized north - they are able to help each other. We expect that, in future, we will increasingly see 'brother-sister' relationships between biotech firms in the developing world, and fewer 'parent-child' relationships with firms in developed countries."

"This first-ever survey of such relationships reveals that there are huge benefits to so-called 'south-south' collaboration, that the seeds of such collaboration can indeed deliver the fruit of better health to those in need."

For example, during Africa's 2007 meningitis outbreak, biotech firms in Brazil and Cuba used their respective strengths to provide African countries with affordable vaccines to prevent further spread of the disease.

"By working together, the two countries quickly developed a cost effective <u>vaccine</u> for Africa -- a clear example of how south-south collaboration is motivated by solidarity with each other and can actively improve global health," says co-author Dr. Tirso Sáenz of the University of Brasilia.



And, to combat persistent cholera outbreaks, firms in Bangladesh and India have teamed up to develop a new vaccine that, if successful, will be manufactured by the Indian firm Biological E (Hyderabad, India).

"India has strength in vaccine manufacturing and can do it cheaply. This is an advantage that other countries and international organisations should take advantage of," says co-author Dr. Sachin Chaturvedi of the New Delhi think tank Research and Information System for the Developing Countries.

Firms in Brazil, China, Cuba, Egypt, India and South Africa reported nearly 280 south-south collaborations. Brazil reported more than 60 such arrangements while mighty China -- reflecting its massive domestic market -- had fewer than little Cuba, a long time leader in innovative health strategies.

Surprisingly, governments and international organizations play a minimal role at this point, involved in less than 10 per cent of all south-south collaborations, the study reports.

Still, third party organisations can be important for south-south collaborations. The World Health Organisation, for instance, was crucial for the success of the Brazil-Cuba collaboration in providing meningitis vaccine for Africa, and the Academy of Sciences for the Developing World has been instrumental in building capacity through south-south collaboration in poorer African countries.

In many ways such collaborations are a more relevant model of promoting innovation than the traditional model of relying on linkages with developed countries.

Says Dr. Wen Ke, a co-author from the Chinese Academy of Sciences: "Even large countries such as China need at times to look beyond their



borders to access the necessary expertise."

South-south collaborations strengthen the capability of firms in southern countries to meet shared problems by pooling their expertise and resources -- to address issues rich countries in the north may not be affected by, nor interested in," says Dr. Victor Konde from the University of Zambia.

Earlier research shows Africa bears a quarter of the world's disease burden, yet accounts for less than one per cent of global expenditure on health. Sub-Saharan Africa imports nearly 90 per cent of its medicines. However this could rapidly change with 37 countries on the continent now engaged in some form of medicine production.

Collaborations have enabled Egypt and Tunisia to meet the majority [60-95 per cent] of their own drug needs now.

"This locally-appropriate technology transfer between developing countries can bridge the divide between the health biotech haves and have nots," says Dr. Magdy Madkour at the Ain Shams University in Cairo. "When Egypt faced a shortage of insulin imported from developed countries, only China's door was open to overcome the insulin deficiency crisis."

Firms in developing countries are far from reaping the full benefits of south-south collaboration but cannot be expected to do everything on their own, according to the study.

Governments in the south need to better integrate south-south collaborations into their innovation policies and provide support to joint activities of firms from different developing countries. International organizations and philanthropic organizations engaged in promoting global health need to pay attention to the power of such south-south



engagement in providing affordable health products.

"What is actually needed is a model of north-south-south collaboration, which harnesses the appropriate learning between developing countries and the technological and financial strengths of the North", says coauthor Dr. Abdallah Daar of the MRC.

"There is considerable potential for firms in developing countries to be more cost effective than those in developed countries, providing health products that can reach more poor people in the developing world," he adds. "If successful, south-south collaboration increases capacity in science-intensive fields, improves the ability of developing countries to address their own problems, and contributes to economic development and quality of life in developing countries."

Although collaborations in science and technology have been high on the agendas of developing countries since the 1960s there has been little study of such collaborations and none at all into the health biotech sector until now.

Of the 288 health biotech firms that responded to the MRC survey, 27% reported south-south and south-north collaborations. South-north collaboration still dominates, with over half (53%) of the firms reporting collaborations with developed countries.

The study also determined that the vast majority (near 90 percent) of south-south collaborations relied on formal arrangements that ranged from supply agreements, to R&D cooperation and licensing agreements, to marketing and distribution agreements.

Cost and risk reduction are among the primary drivers of these partnerships but obtaining access to new markets is of paramount importance, firms reported, particularly for small countries like Cuba



that are especially dependent on exporting their products to develop a more balanced economy.

Collaborations also open the door to vital new research knowledge and technical skills.

"Everyone brings something to the table in successful collaborations: scientific expertise, technologies, skills, contacts and experience," says Dr. Thorsteinsdóttir. "For instance, many small firms taking their first steps in product development often need help navigating the regulatory environment."

Developing country biotech firms are increasingly aware of the importance of promoting development and innovation through joint efforts with one another, and have set up networks to deal with malaria, tuberculosis, HIV/AIDS and other common diseases. Brazil, China, Cuba, Nigeria, Russia, Thailand and Ukraine are working together in a network that jointly promotes research and development aimed at developing innovative diagnostics kits, drugs, and vaccines for HIV/AIDS prevention and treatment.

Concludes co-author Peter A. Singer, MD, Director of the MRC: "There are 5 billion brains in the developing world. When they connect, the light bulbs will really start to glow. And the more they work with each other, the less they will depend on the industrialized world."

#### Further examples, south-south collaborations:

### **Global south-south-north consortium for clinical cancer trials**

Nimotuzumab is cancer therapeutic aimed at various cancer types including esophageal, brain metastasis, colorectal, pancreatic, prostate, cervical and breast. To carry out cost effective clinical trials on



nimotuzumab, CIMAB SA (Havana, Cuba), and its partner YM BioSciences (Mississauga, Canada), have established a consortium of mainly small biotech firms from 20 <u>developing countries</u> as well as seven developed countries.

As a result nimotuzumab has been approved as a treatment for head and neck cancers and glioma, in 23 countries worldwide including Argentina, Brazil, China, India, Indonesia, Mexico and Ukraine. The consortium members license the drug from CIMAB and market it in their home countries. By including a south-south collaboration strategy, biotech firms can bypass pharma companies, retain greater presence in latter stages of the product's development, and potentially have a greater share of the revenues.

### Vaccines for Africa's meningitis outbreak

To counter a meningitis outbreak in 2007 the World Health Organization (WHO) identified Bio-Manguinhos (Rio de Janeiro, Brazil), in collaboration with the Finlay Institute (Havana, Cuba), as the most suitable suppliers of a meningitis vaccine. They relied on their respective strengths in the development and manufacturing process and neither firm alone would have been able to respond so quickly and efficiently to this request. This shows how south-south collaboration can be harnessed to address a health threat spurred by demand and funding from an international organization.

# South- South approach to dealing with HIV/AIDs based on local biodiversity

China and Thailand are working together to develop a remedy against HIV/AIDs based on Chinese biodiversity and knowledge from traditional Chinese medicine. After extensive animal testing in China,



clinical trials began in Thailand where the incidence of HIV/AIDS is far higher. The herbal-based anti HIV drug -- Complex SH -- is the first to ever undergone Phase I, II, and III clinical trials. Complex SH is said to inhibit growth of HIV and kill the virus and has an efficacy rate of 89% when used alone, and even higher with other therapies. And all without the side effects that accompany a similar class of biomedical drugs.

The product is patented and has received regulatory approval both in China and Thailand.

## Extending health biotech capacity through southsouth collaboration saves Egypt's diabetics

Human insulin has at times been in short supply in Egypt, a considerable health threat to the country's diabetics. To help overcome this, the Holding Company for Biological Products and Vaccines (VACSERA, Giza, Egypt) transferred the technology to produce recombinant insulin from the Chinese company Dongbao (Shanghai, China) and can now produce recombinant insulin locally. As a result, Egypt is capable of meeting its own demands for insulin and ensuring a more affordable product is available to its population in need.

# India-Africa Bridge the Technology Divide through joint-ventures

India has transferred technology for diagnosing infectious diseases to South Africa. As part of a joint venture between the publicly funded, LIFElabs in South Africa (Durban, South Africa), and the Indian Tulip Group Diagnostics (Bambolim, India) the Indian company agreed to transfer several diagnostic technologies to South Africa including rapid malaria diagnostic kits, and pregnancy diagnostic kits. The Tulip Group committed to transfer the technology and provide substantial capacity



and technical assistance. By transferring the technology to South Africa, the South African firms are able to diagnose diseases locally and rapidly.

#### Provided by McLaughlin-Rotman Centre for Global Health

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