

India sets its sights on global health care market

To promote India as a global health destination, the Indian government has announced in its annual federal budget a series of new tax concessions and incentives for private investment.

The new scheme, announced 28 February, aims to boost investment from foreign pharmaceutical companies and projects India as an attractive place for drug research and clinical trials. The budget for domestic biomedical research, however, is at Rs 9.8 billion—up just 1% from last year.

The announcement was greeted with cheers from the pharmaceutical sector. "For the first time, pharmaceutical and biotech industry are treated at par with the much-pampered information technology," says Khalil Ahmed, director of Hyderabad-based Shantha Biotech. "It is a clear recognition of health care sector as a knowledge-based industry with great export potential."

The new budget includes Rs 1.5 billion to allow Indian companies to develop original drugs. Copying foreign drugs—which Indian companies are famous for doing—will be outlawed by a new patent plan effective in 2005. The government will not tax royalties earned by drug companies and will waive excise

and customs duties on life-saving drugs. International companies like Novartis, GlaxoSmithKline and Pfizer and Indian biotechs like Ranbaxy will all benefit from a cut in customs duties on bulk drugs.

Most important, drugs and materials imported for clinical trials will not be taxed. "This will enable India to become more competitive as a center for clinical trials," says Kewal Handa, finance director of Pfizer's Indian operations.



As a result of all these measures, prices of vaccines, drugs and diagnostics are bound to fall. One company has already announced a 16% cut in the price of its anticancer drugs and a 10% cut in the price of glucometers. Boston Scientific, the largest equipment supplier to Indian hospitals, has also proposed a downward revision of prices.

Lack of funding has thus far been the biggest obstacle to the growth of private hospitals. The government eliminated

this constraint by extending tax benefits to investors in private hospitals with 100 beds or more. It also reduced the import duty on life-saving equipment from 25% to 5% to encourage hospitals to import the latest equipment.

The private sector already accounts for about 70% of India's health care services market and the latest incentive will further fuel the growth, says Pratap Reddy, chairman of the private Apollo hospitals. "This budget will definitely see domestic investments of Rs 25 billion to Rs 50 billion in health care and foreign direct investments in billions of dollars," he said. "It is a signal to foreign investors that we are now open for business."

Health care costs in India are about one-tenth of those in the US or the UK, says Reddy, whose Apollo hospitals already have patients from west Asia and Africa. The average cost of a cardiac surgery at the best hospital in India is only \$4500, with a success rate of 98.5%. A single tooth filing costs \$10 against \$300 in the US. With its technology, skilled specialists, sound infrastructure and paramedical staff, Reddy says, "India can become a global health care destination."

K.S. Jayaraman, New Delhi

'Fools' rush in where genome giants fear to tread

Wrangling the last bits of sequence from the human genome could provide a few surprises—enough to drive research into some tricky territory beyond the original goals of the Human Genome Project. For people who work on duplicated and unstable regions of the genome, for instance, work has just begun.

"A few fools go into these regions, and we are among them," says Evan Eichler, assistant professor of genetics at Case Western Reserve University. Eichler's group painstakingly catalogs duplicated sequences in the genome and places them in the correct positions. Because duplicated regions are particularly susceptible to breaks and rearrangements during recombination, they underlie many human genetic diseases and may even drive evolution, Eichler says. They are also the source of many of the missed and misplaced genes in both the Celera and publicly-funded sequences.

The Human Genome Project aimed to sequence at least 95% of each chromosome—excluding centromeric heterochro-

matin—with all gaps sized, oriented and annotated. The sequenced regions were to be 99.99% accurate at the nucleotide level. On 14 April, leaders of the project are expected to announce that they have achieved that aim.

The stated goals have most likely been met, says Huntington Willard, past president of the American Society of Human Genetics. But "it would be a shame if they were to say they are done, full stop," he says. Willard, who plans to sequence heterochromatic regions, says it is critical that researchers continue trying to accurately place duplicated regions on the genome.

"This is heavy lifting but the payout will be fascinating and likely important," says Willard. "It's worth it from any number of perspectives—philosophically, evolutionarily and medically."

Duplicated regions, which can exceed 400 kb, account for half of the known gaps in the sequence, says Eichler, and either get pinned to the wrong place or dropped off the map entirely. That's particularly problematic when a duplicated region is larger

than a bacterial artificial chromosome, the sequencing unit for genome projects.

It is difficult to determine precisely how many duplicated regions are missing, says Julie Korenberg, professor of genetics at the University of California in Los Angeles. At the American Society for Human Genetics annual meeting last fall, Korenberg estimated that 47% of 580 bacterial artificial chromosomes with known duplications contained sequences that were either missing or misassembled in the publicly funded genome sequence. That number has dropped to below 20% so the data are improving, she now says. Similar problems afflict the Celera sequence, she adds.

Duplicated regions are enriched for genes with roles in immunity and development. They may also underlie some of the variability in the human population's susceptibility to disease. "If you are the sort who says you look for treasure under the light," says Willard, "then this is where you should be shining the light."

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