

News Details

Vaccines for Pennies

Feb 19, 2005

WHEN Krishna Ella went to venture capitalists in 1995 he was laughed out of their offices. A molecular biologist at the University of Wisconsin in Madison, he was proposing to make hepatitis B vaccine in India, his native land, for a mere dollar a shot. At the time UK drug firm SmithKline Beecham was selling the product in the west for 20 times that amount. "People thought: there's no way this guy can produce this vaccine at a dollar," Ella recalls.

Undeterred, he and his marketing manager wife Suchitra Ella sold their houses in America and India, abandoned their US careers and left for Hyderabad to set up their own company. They sank all they owned into the venture, begged money from friends, and finally won backing from an Indian bank. Their company, called Bharat Biotech, now sells the vaccine in developing countries for 28 cents a shot. It owns the second biggest production facility for this vaccine in the world and has an annual turnover of \$7.3 million. "Those venture capitalists are kicking themselves now-you bet!" says Suchitra Ella.

The pair are typical of highly educated Indian expats who have forged their careers in the west, but are now returning to take advantage of new economic opportunities at home. Their intimate knowledge of western science and business is invaluable, and they are natural risk-takers. After all, this is not the first time in their lives they have made a daunting fresh start. "There is always dogma in science," says Krishna Ella. "To break the dogma you need to take risks."

Krishna and Suchitra Ella wanted to give something back to their home country, and setting up in India made good financial sense too. The country's economic liberalisation in the early 1990s has led to a wealth of new business opportunities and there is also a ready supply of well-educated scientists who are less costly than their US counterparts. And some states are throwing money at biotech start-ups. Genome valleys and knowledge parks are the current vogue as politicians try to tempt entrepreneurs with tax breaks, simplified regulation and guaranteed high-quality water, power and communication links.

So how did the Ellas manage to undercut the competition so dramatically? Hepatitis B is caused by a virus that attacks the liver, and which can cause lifelong infection, liver failure and cancer. It is usually spread through sex with someone who is infected, or by drug users sharing needles. In 1986 SmithKline Beecham launched a vaccine for hepatitis B, the first in the world to be produced by genetic engineering. It is made by adding genetic material to yeast cells so that they produce a key protein from the surface of the virus. People who are immunised with that protein produce antibodies that protect them should they subsequently encounter the virus.

Ten years ago Krishna Ella spotted that the purification method SmithKline Beecham used to extract the vaccine protein was relatively inefficient and costly. The multinational was using - and still uses to this day - a technique called ultracentrifugation, in which samples are subjected to 100,000 times gravity to separate the protein from DNA.

The equipment cost over \$1.5 million and only recovered 15 per cent of the protein. What is more, the technique used caesium chloride, which is expensive and has to be completely removed from the final product because it is toxic. That makes disposal costly too.

Krishna Ella spotted that the method being used to extract the vaccine protein was inefficient and costly

Krishna Ella had come up with a new purification process that would eliminate ultracentrifuges and caesium chloride, and boost efficiency to 80 per cent. The vaccine protein has a phospholipid tail that is electrically neutral, unlike most of the yeast proteins and DNA, which carry an electrical charge. With Ella's method, called the Himax technique, the vaccine protein can be made to precipitate out of the solution onto a special matrix, while all the charged molecules stay put.

Bharat has since started manufacturing other products, such as a typhoid vaccine and an antibiotic for use against staphylococcus bacteria, which can cause skin and blood infections and pneumonia.

And the firm has got funding from the Bill and Melinda Gates Foundation to carry out malaria vaccine research and to develop a cheap vaccine for rotavirus, a major cause of childhood diarrhoea in poor countries. This type of diarrhoea kills about half a million children every year.

Krishna Ella says he wants to tackle third-world diseases neglected by the multinationals, a sentiment often voiced by Indian entrepreneurs who believe scientists have a duty to the poor.

"It feels very satisfying," says Suchitra Ella. "We are on top of the world because we are doing something that is really required for countries like India."