PROFILE: GURSARAN PRASAD TALWAR

Pushing the Envelope for Vaccines

Gazing at the cream interior of Gursaran Prasad Talwar's office in New Delhi, I idly count about 40 framed certificates and medals—the French Legion of Honor, the Padmabhushan from India's president, a dancing Shiva with a citation at its base. The medals are displayed in velvet-lined cases laid open on the bookshelves, flanking brightly colored volumes on immunology and contraception. After some 30 minutes, Talwar turns around from reviewing a student's paper to ask what documents I need. The 70-year-old man projects an aura of power and vigor. His accented, measured speech is touched with an edge of wariness; I wonder why. I collect a volume and leave. The real interview is the following day, a Saturday, at Talwar's home.

Talwar, declares Sheldon Segal of the Population Council in New York City, is one of the top three scientists from the developing countries—"maybe the top one." In the 1970s Talwar pioneered a contraceptive vaccine that induces antibodies against part of the reproductive process in women. As the founder of India's National Institute of Immunology (NII) in 1986, he is credited with creating a world-class institute and training a generation of scientists. The ventures flowing from his fertile brain include a vaccine against leprosy, a topical contraceptive derived from the neem tree, a male contraceptive vaccine and others against prostate and lung cancer.

The next morning it takes fully 13 landmarks, sketched by Talwar on a map, for my taxi driver to find the whitewashed house at the end of a labyrinthine road. A uniformed guard opens the gate, escorting me into a living room hung with canvases by prominent local artists. Talwar is elegant in casual *khurta-pajamas;* he pours himself a drink while I settle into the silk cushions and request a coffee to clear my head. I note that I am intimidated by Talwar—as an Indian woman half his age, I automatically take on a respectful tone, and he, a paternal one. We begin, cautiously.

Talwar started his career by studying immunology at the Pasteur Institute in Paris. In 1956, after completing a Humboldt Fellowship in Germany, he joined the brand-new All India Institute of Medical Sciences in New Delhi. "For the first six years, we could do nothing," he recalls. "There were no buildings." After the facilities were built, he worked on ovarian hormones, figuring out an essential way in which estradiol promotes the growth of the uterus. "Talwar was a pioneer in demonstrating these steps," Segal attests. "He has not gotten enough credit."

The research was exciting. "But, you see, living in a country where you are surrounded by so many problems, you cannot remain immune from what is happening around you," Talwar explains. One ailment that caught his attention was leprosy. Only 1 percent of those who are exposed to the disease contract it. Talwar discovered a bacterium, called *Mycobacterium w,* that enhanced their immune response and speeded up the treatment regime. In one of his papers, I find astonishing before-and-after pictures, showing a woman's features transformed from a grotesque glob to a smooth, shiny face.

The vaccine is now undergoing clinical trials in India, along with rival vaccines from the World Health Organization and from Madhav G. Deo of the Cancer Research Institute in Bombay. Later I learn that Deo has alleged that *Mw* is actually the Bombay bacterium, which Talwar acquired and renamed: the two organisms are reported to be almost identical. Talwar admits to receiving Deo's culture but insists that *Mw* is different and that Deo has refused to provide his bacterium for comparison.

A six-year-old girl with dark eyes and a long braid, Talwar's granddaughter Nayana, shyly comes in to display her colorful sketch. Duly admiring it, Talwar continues as she climbs all over him. "You know, in India you have to work on more than one problem at a time. Partly because, at that time, we were very dependent on chemical reagents imported from abroad. You could be held up for months for lack of one chemical." In choosing his second problem, Talwar drew from his visits to the plains of the Ganges. "Even coming from Delhi, I

RAGHU RAI *Magnum*

found the people in Benares to be diminutive, to be like those Japanese trees—what are they called?" I supply the name. "Like bonsai. You have all the features there, but somehow they are more stunted. Why were they nutritively so undernourished?" Concluding that the problem was overpopulation, Talwar observed that the available contraceptives required too much motivation.

Talwar decided to develop a vaccine. His target was human chorionic gonadotropin, or hCG, the hormone that allows an embryo to be implanted in a uterus. Although hCG consists of two subunits, alpha and beta, it was considered safest to stimulate antibodies to just the beta subunit. To induce an immune reaction, Talwar coupled the beta hCG to something the body would recognize as an enemy: the tetanus toxin. The result was a vaccine against pregnancy and tetanus.

"In India you have to work on more than one problem at a time."

In the early 1970s the WHO decided to fund research on contraceptive vaccines, supporting a similar program headed by Vernon Stevens at Ohio State University. The WHO argued that because parts of beta hCG resembled the beta subunit of the luteinizing hormone (LH), Talwar's vaccine caused antibodies to LH to be developed as well, raising fears of complications. Stevens's vaccine, based on a unique fragment of beta hCG, was deemed safer. "If we were both given funding, it would have been okay, stimulated healthy competition," Talwar says with some bitterness.

But Talwar did have supporters. The Population Council stepped in, conducting trials in Finland, Chile and the Dominican Republic, and in 1976 the International Development Research Center in Canada started to fund research in India. The longer beta hCG chain used by Talwar, it turned out, was more efficacious in producing antibodies (although it generated enough in only 80 percent of the women). "Surprisingly, LH was not a problem," says Nancy Alexander of the National Institutes of Health. Trials of the WHO vaccine, on the other hand, were suspended in 1994 after several women developed reactions at the injection site; the trials may resume next year with a reformulated vaccine. Still, Talwar's vaccine needs more work: its effects wear off in three months, necessitating repeated injections.

Talwar has his critics on this front as well. Autar Singh Paintal, a prominent cardiologist who heads the Society for Scientific Values in New Delhi, charges that in 1974 Talwar injected women with a contraceptive vaccine before trying it out on animals—a claim that Talwar says is absurd. But the WHO's David Griffin also reports that Talwar had apparently vaccinated women without adequate animal studies. Whatever the truth may be, women's organizations have strongly opposed the vaccine. One group, Saheli, advises women to avoid the vaccine, warning that they may be "tested upon." Part of the problem, explains Saroj Pachauri of the Population Council in New Delhi, is the adversarial relationship that the Indian population-control program has traditionally had with the women who are its targets.

The vaccine faces other barriers as well. The Population Council has discontinued its trials because of a lack of funds. Although most doctors consider pregnancy to begin when an embryo attaches to the uterus, the U.S. Congress, among others, deems it to begin when the sperm attaches to the egg. By the second definition, Talwar's and Stevens's vaccines are abortifacients and cannot receive American funding.

Talwar pours himself a second drink. "I am feeling in a holiday mood," he explains. "I am having a man come over to give me a massage. A luxury that is affordable in India." The caffeine and the alcohol, I note with relief, have both taken effect. Nayana comes in to play again; we take a break, with Talwar showing off his art collection. I venture to ask more about his life.

Talwar's mother died eight days after he was born—tetanus, he guesses, a major killer of women in childbirth. That realization led him to choose tetanus as the conjugate in his pregnancy vaccine. Brought up in Lahore, Talwar was athletic in college, the captain of his rowing team. Then came the partition: independence from Britain, in 1947, gave bloody birth to two nations, as Hindus and Muslims slaughtered one another. Talwar was in India at the time and suddenly found his home to be in Pakistan. "I did not know where my parents were," he relates. He joined a military convoy put together by the Indians to rescue Hindus in Lahore but, arriving there, found his house stripped, empty.

Talwar, who is Hindu, mercifully ran into a Muslim poet, Hafeez Jullundary, who risked his own life by hiding Talwar in the secluded women's quarters of his home. Sometimes Talwar, who grew a beard and donned a cap to pass as a Muslim, would venture into the city to persuade the few remaining Hindus to leave. With one father and son, he did not succeed; later he found them shot. "Funny that people who looked very much alike, spoke the same language, had to kill each other," he muses dispassionately. Talwar eventually found his father, safe but broken, in India.

If it had not been for the partition, Talwar shrugs, he would most likely have been running his father's factory in Lahore. The only thing he misses about his life there, he confesses, is his room full of rowing trophies. For an instant, I have a vision of his office at the NII, an institution that Talwar built from scratch, planting the trees at its periphery even before construction began.

Talwar has just retired from the NII, to join the International Center for Genetic Engineering and Biotechnology. The contraceptive vaccine project remains with the NII: "I have left all the legacy—grants, money, patents, science and a base. If it materializes or not, I have no say." Talwar is concentrating on the neem cream and his anticancer vaccines.

Yet another controversy surrounding Talwar has to do with TALSUR, his male contraceptive vaccine for animals. Maneka Gandhi, a former minister of environment—perhaps best known as the rebellious daughter-in-law of the late prime minister Indira Gandhi—charges that Talwar's vaccine has killed "a great many" dogs. "He kept saying nothing was wrong with the vaccine, the application was wrong," Gandhi attests. So she had him inject her own pet: "I had to have him operated to save him." But Talwar protests that he does not know of any confirmed deaths.

Nayana is hungry, and so am I. Talwar graciously invites me to share their light lunch—which he says is one secret of his vitality, along with yoga. Tucking the napkin under Nayana's chin, Talwar tells me of his concern for the many problems Indian women face: he has set up a trust that allows women to resume scientific careers interrupted by marriage. Soon I take my leave, walking out into the hot sun to wake up the taxi driver, who is curled up across the front seat. Turning to wave good-bye to Talwar, I realize that the man remains an enigma. —*Madhusree Mukerjee*