

| QUARRAISHA ABDOOL KARIM |

TOP THREE AWARDS

- Science-for-Society Gold Medal Award from the Academy of Science of South Africa, 2014
- TWAS-Lenovo Science Prize, 2014
- L'Oreal – UNESCO Laureate Award for Africa and the Middle East, 2016

DEFINING MOMENT

The podium presentation at the International AIDS Conference in Vienna in July 2010 of the results of the CAPRISA 004 trial of tenofovir gel in women that provided the first evidence that antiretrovirals can prevent sexual transmission of HIV.

WHAT PEOPLE DO NOT KNOW

I love watching good Bollywood movies.



PROTECTING WOMEN AGAINST HIV

Few AIDS researchers have done as much to help the plight of poor, rural women in South Africa as Quarraisha Abdool Karim.

Since identifying the vulnerability of this group to HIV in the early 1990s, she has worked tirelessly to understand the problem and to design tools that women can use to protect themselves against infection.

At times, it has been an uphill battle. Patriarchal structures in communities and the high levels of violence against women make HIV in these communities not just a medical problem, but also a social one. Abdool Karim has worked closely with communities in her home province of KwaZulu-Natal to build the trust necessary to produce solutions that work in practice, not just in the laboratory.

In so doing, she has created a rare window into what it means to be a young South African girl or woman living in a rural area, struggling day to day to make ends meet, while at the same time facing the ubiquitous threat of AIDS. Her work is far from over. "Young women still bear the brunt of the epidemic. It's a big challenge, but I thrive on challenges," she says.

EDUCATION AND EARLY LIFE

Abdool Karim grew up in Tongaat, a small town north of Durban. Her great-grandfather arrived in South Africa from South India to work as a liaison officer between Indian labourers in the sugar cane fields of KwaZulu-Natal and their English-speaking masters. Her father and mother were small-scale vegetable gardeners. Her parents valued education highly, but saw it as a means to a career in law, medicine or engineering. When their daughter said she wanted to study science, their response was "What kind of a profession is that?"

However, their daughter was a natural-born scientist. By the time she was two years old she discovered electricity and her curiosity led her to more and more discoveries driving her parents to get her started in school by age four to keep their sanity. School was able to fulfil her insatiable desire to learn about everything. Even though she attended a poorly resourced

school, Vishwaroop Primary School, with over 40 children in a classroom, she had inspiring and truly dedicated teachers of whom she has fond memories.

She studied science for her undergraduate degree at the University of Durban-Westville, graduating in 1981 with majors in microbiology and biochemistry. She went on to study for an Honours degree in medical biochemistry at the University of the Witwatersrand (Wits) in Johannesburg after having spent a year getting hands-on immunology experience under the mentorship of Professor Ruben Sher, one of the first clinical immunologists in South Africa to respond to the emerging threat of AIDS.

After spending the next two years working in the Iron and Red Cell Metabolism Research Unit at Wits, she returned to Durban thinking she might become a science teacher, having obtained a teaching diploma through part-time studies at the University of South Africa (Unisa). After a short teaching spell she returned to research, this time in a genetic blood disorder at the Department of Haematology, University of Natal. During this time, she was actively involved in the anti-apartheid health sector, notably in the Emergency Services Group training other activists on how to administer first aid to wounded comrades in the townships.

She met her future husband, Salim Abdool Karim, in 1987, and they married four months later. After the wedding, Quarraisha joined her husband in New York where he was studying epidemiology at Columbia University. She studied epidemiology and parasitology at Columbia mentored by Dr Zena Stein, a fellow South African who had pioneered health care provision in a black township in Johannesburg before leaving the country in the 1950s.

When the couple returned to Durban in late 1988, Quarraisha Abdool Karim took up a parasitology position with the South African Medical Research Council (MRC), undertaking non-human primate research in amoebiasis. With her community-focused background and recently acquired (and still rare in South Africa) epidemiological skills, it was not long before she moved her focus to HIV/AIDS. At the time, studies on HIV were limited and

restricted to surveys in South Africa's migrant mining population. There was scant data on HIV infection rates in the general populace.

She established the MRC AIDS Programme in KwaZulu-Natal in 1989 and performed one of the first community-based epidemiological studies of HIV infection in South Africa in 1990. It piggybacked on a Department of Health malaria surveillance programme that involved house-to-house visits in rural KwaZulu-Natal, collecting blood for malaria screening. The survey, which screened 5 000 people of all ages, found that 60 people were HIV positive, a prevalence of 1.2 per cent. When she repeated the study a year later, the prevalence had doubled. This raised a red flag about the potential problem of rapid spread of HIV in South Africa's poor communities.

Quarraisha Abdool Karim's data also showed that infection rates were much higher among women than men and that, disturbingly, young women were getting infected in their teenage years, while men tended to become infected in their late 20s. She realised, that this suggested that HIV was spreading between older men and younger women, clearly identifying teenage girls as a particularly vulnerable risk group for HIV.

STEERING SA'S AIDS RESPONSE

In the early 1990s, Abdool Karim convened a group of scientists working on HIV in Durban to meet once a month and discuss their work. News of the group spread to rural clinicians, and it eventually became the KwaZulu-Natal AIDS Forum. Community groups attended the meetings to talk about challenges they were facing. She also served on the first National AIDS Co-ordinating Committee of South Africa, which was tasked with writing the country's first national AIDS plan.

In 1994, she was asked by the Mandela government to establish and lead the National AIDS Programme. With antiretroviral treatment using combination drugs still to be discovered and South Africa experiencing the early stages of an asymptomatic HIV epidemic, the programmes she oversaw focused on prevention and education. She stayed in the post for two years, during which she had to navigate the government's blunder in spending

over R14 million on an ill-judged play called *Sarafina II*, which critics denounced as inappropriate and unclear.

In 1997, Abdool Karim returned to the MRC as a researcher and started to undertake clinical trials testing novel prevention interventions. At the same time she co-ordinated the Columbia University – Southern African Fogarty AIDS Training Programme, which trained scientists in southern Africa to respond to the HIV and TB epidemics. By this time, she was serving on the governing council of the International AIDS Society (IAS), which organised annual AIDS conferences around the world. By the mid-to-late 1990s the IAS wanted to hold a conference in the developing world, which was emerging as the new battleground against the virus. With the help of South Africa's government and other scientists, she was able to secure the 2000 International AIDS Conference for her home town, Durban.

The injustice of the lack of access to antiretrovirals for millions of poor HIV-positive Africans was a major focus of the Durban conference, and the conference succeeded in bringing global attention to this challenge.

Abdool Karim earned her PhD from the University of Natal in 2000. Her thesis was on women and AIDS – epidemiology and gender barriers to prevention in KwaZulu-Natal. In 2001, she began working with her husband on an application to create a new research centre focusing on HIV/AIDS and tuberculosis (TB) in South Africa. The resulting Centre for the AIDS Programme of Research in South Africa (CAPRISA) was funded by the National Institutes of Health in the USA to the tune of R140 million over five years. It was a joint initiative between the Durban-based Nelson R Mandela Medical School, the National Institute for Communicable Diseases (NICD) in Johannesburg, the University of Cape Town, the University of the Western Cape, and Columbia University in the USA.

CAPRISA's flagship research programmes focused on the tuberculosis/HIV co-epidemic and acute HIV infection, as well as on HIV epidemiology and prevention. Abdool Karim wanted the research to have a strong community element. She and her husband were invited to partner with a rural community outside Durban, which had been hard hit by HIV and was look-

ing for help to deal with the scourge. The CAPRISA Vulindlela Clinic was established as a field research clinic in this community in 2002.

THE HUNT FOR A MICROBICIDE

The CAPRISA Vulindlela Clinic was one of two sites where CAPRISA tested a vaginal microbicide that could be used by women to prevent HIV infection. The gel contained the antiretroviral drug tenofovir – the first time an antiretroviral drug had been used as the active ingredient in a microbicide.

Abdool Karim had become determined to find a woman-controlled HIV-protection technology while working with sex workers in the early 90s. She offered HIV testing to sex workers from the Natal Midlands and found that about 60% of them were already infected with HIV. They said they could not insist on condoms and, as sex was their livelihood, abstinence was not an option for them. “They asked me if there was something they could use to protect themselves,” she says.

In the years that followed, Abdool Karim worked on several experimental microbicides. But none of them protected women in the trials against infection. However, the CAPRISA 004 tenofovir gel trial, which ran from May 2007 through March 2010, would change all that.

Women in the trial were instructed to insert the gel before and after they had sex. The results – a 39% reduction of HIV infection in the group receiving the active gel – obtained a standing ovation when it was announced at the 2010 International AIDS Conference in Vienna. The finding was hailed as a milestone in AIDS research. However, later studies of the same gel in other health care settings or using a daily dosing strategy did not show efficacy because of low levels of adherence.

Nevertheless, the CAPRISA 004 trial gave a new lease of life to the microbicide research field, and to HIV prevention more generally. New woman-controlled prevention methods are being tested in CAPRISA's clinics,

including a vaginal ring containing the antiretroviral dapivirine and an injection of a new class of ARV drug called integrase inhibitors. These might be more user-friendly prevention methods for some women, given that they could provide protection for a month or longer.

Abdool Karim is also leading studies to see whether social incentives can help curb HIV-infection rates, especially among teenagers in KwaZulu-Natal. She is the principal investigator on a study to determine whether cash incentives can help improve the outcomes of school-based HIV-prevention programmes. Another of her studies has looked at whether voluntary male circumcision programmes, which have been proven to reduce HIV-infection rates, can be rolled out through schools, and defining the provision of sexual reproductive health services to school-going adolescents and young women.

She serves on a range of international organisations and is a member of numerous academic bodies, including the US National Academy of Medicine (previously called the Institute of Medicine). She holds an A-rating from the South African National Research Foundation (NRF).

A proud working mother, she sees her three children as part of her personal accomplishments. She and her husband have shared childcare duties, and avoid travelling at the same time to maintain stability and continuity at home. She used to block off the hours between 5pm and 8.30pm to give her children baths and help them with their homework and read to them – something she does not have to do anymore, now that the children are all old enough to look after themselves. But this time remains precious for the family to get together at the end of the day.

Says Abdool Karim: “We have made huge progress in our response to the HIV epidemic to the point where the possibility of epidemic control is possible. However, we have a long way to go in empowering young women to protect themselves from HIV and until then we have to soldier on. Failure to prevent HIV infection in young women in Africa is not an option.”